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INFORMATION MANAGEMENT: POTENTIAL & PRACTICE

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The Information Society – how different?

Bruce Williams

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Keynote paper presented at the 57th Aslib Annual Conference 'Information Management: Potential and Practice', University of East Anglia, Norwich, England, 18–21 September 1984.

It was, I suspect, Daniel Bell – the Professor of Sociology at Harvard University – who invented 'the information society'. In 1973 he had written of 'the coming post-industrial society' as the consequence of three key developments – first, the rise to dominance of the services sector of activity; second, the growing role of theoretical knowledge for innovation in technology, making invention more the parent than the child of necessity; and, third, the displacement of intuitive business judgements by systems analysis and decision theory which he described as the 'new intellectual technology'.

Seven years later he responded to the literature on 'the micro-electronic revolution' and wrote of the advent of the 'information society' in a book of essays on *The computer age*, edited by Dertouzos and Moses.

It is not, I think, a very happy concept, and it does not catch the essence of the significant changes that Bell is trying to identify. We can drown in information, and some of us suspect that before long we will. Bell quoted from Eliot –

> *'Where is the wisdom we have lost in knowledge?*
> *Where is the knowledge we have lost in information?'*

– but his mind was not on the danger that wisdom and knowledge would be swept aside by the rising tides of information flows. Mere information is not equivalent to the knowledge which is said to give power. That comes from the capacity to get and to analyse relevant knowledge and then to make sound decisions, and that is what Bell has in mind – namely, the increase in *the capacity to manage organised complexity* made possible by the combination of IT and new intellectual technology.

The trends which Bell tried to encapsulate in his concept of the 'information society' cannot be explained in terms of computers and later developments in IT, important though they have been. They are part of more general changes which have taken place during the last 200 years. Before that time there were many inventions and innovations. But they were episodic and isolated, whereas technical change in the last 200 years

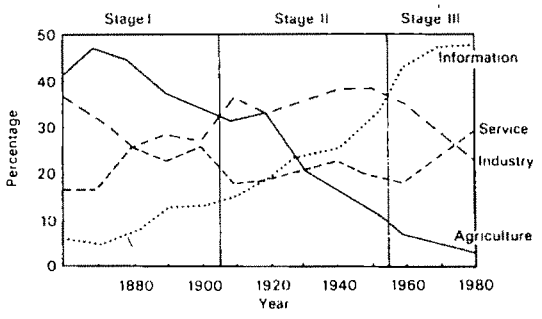
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has been a cumulative and rapidly diffusing process. One of the most important consequences has been the continuing and spreading capacity to produce more food with a diminishing proportion of the labour force, leading both to a great increase in world population and to rural depopulation. In industry too, innovations have reduced the amount of labour needed per unit output, though there the invention of a great range of new products led to an increase in the proportion of labour employed in manufactures, at least until wealth per head increased by a factor of 4 or 5 beyond the levels in 1850. With the increase in wealth that the development and use of new technologies made possible, the patterns of expenditure changed. The demand for services – shopping, banking, insurance, education, health, theatres, travel facilities for holidays and recreation, and public and social administration – increased and absorbed a growing proportion of the labour force.

Following increases in wages and salaries made possible by these increases in powers of production, the annual hours of work fell – in Britain by about 50 per cent in the last 100 years – and the average age of joining the labour force rose. As increases in personal incomes raised tax yields, governments were encouraged to spend more on education and research. Although the role of increases in education and research in promoting and making good use of further innovation is frequently emphasised by educators and researchers, increases in education and research have been at least as much a consequence as a cause of the introduction and diffusion of new technologies. Another important consequence of this cumulative and self-generating process of technical change has been the role of new instruments in increasing the productivity of research. Such instruments (including the recent additions of computers and micros) played an important part in the unravelling of the genetic code, and in the gene-splicing activities that followed and are now playing an important part in observations and experiments in space.

Changes in employment are reflected in the following graph, in which 'services' have been divided into 'information' and 'other services'.

FIGURE 1. *The distribution of employment*



Tertiary activities

The first published analysis of this change in the nature of activity was in the early 1930s in a book by A.G.B. Fisher, a New Zealand economist working in Australia. He added the category of tertiary activities to primary and secondary production activities, and predicted that the proportion employed in tertiary activities would increase as wealth increased. Then in 1958, Fritz Machlup, an Austrian economist working at Princeton, published his important study of *The production and distribution of knowledge in the United States*. He calculated that 30 per cent of the US labour force was employed in the production and distribution of knowledge – in such activities as research, teaching, printing, publishing, library services, consulting and so on. Marshak later calculated that by 1968 the proportion had reached 40 per cent.

From the US National Income Accounts in 1969, Marc Porat estimated employment in 'the primary information sector' (in which, as in the case of printing, publishing, education, banking, accounting, consultants' services, and telecommunications, there is a direct sale of information services to consumers), and in 'the secondary information sector' (where planning, programming, marketing, and general information activities within organisations contribute to production and distribution). Porat estimated that 22 per cent of employment was in the primary and 21 per cent in the secondary information sector. That statistical analysis, and the expectation that the 'mighty micro' would soon increase the percentage of employment in the primary and secondary information sectors, explain Bell's description of the US as an information society as a fact rather than as a forecast.

Why this growth?

It is important to understand the general reasons for this recent and prospective growth, and not to treat it as a simple consequence of technical change. The key factors in the growth of information activities have been the rapid growth of knowledge (the 'knowledge explosion'), the growth in the capacity of more educated communities to make good use of knowledge, and the pressures to find activities suited to more highly educated workers, as well as the technical developments in telecommunications, computers, chips, optical fibres and satellites.

In *Little science, big science*, Derek de Solla Price estimated that there were about 100 journals of science in 1800, about 1000 by 1850 and 30,000 by 1963. He expected the growth in the number of scientific reports and documents to conform to the normal growth curve, and he guessed that we passed through 'the mid period in the general logistic curve of science's body politic' in the 1940s or 1950s. However it is now clear that Price put the mid period too early. As judged from the number of abstracts published for 19 scientific disciplines there has been a slight rise, not a fall, in the annual growth rate.

One of the features of the growth in knowledge has been the growth of division of labour and specialisation, which has proved as productive in

research as in manufacturing. With the growth in the scale of activities and in the number of specialities, problems of communications between scientists in given fields and across fields increase. The publication of abstracts helps, but with the growth in the number of abstracts, the problem of finding abstracts that may be relevant increases each year. The needs of scientists have been an important factor in the development of modern information technology. For them, information storage and retrieval systems are of vital importance.

Working scientists are part of the broader educated community with a capacity to make good use of more knowledge. Some of the key developments in modern IT were financed by Ministries of Defence, but that of course has not stopped their use in civil activities. Whymper was once asked why he wanted to climb Everest, and he answered: 'because it is there', and many uses of IT in industry and commerce could be explained in the same way.

There are many firms and government departments in which the uses of modern information technologies have run ahead of their usefulness. Doubtless in time the effectiveness of use will increase, but there will always be pressures to use technologies which workers with higher education find interesting. That will ensure the growth and maintenance of bureaucratic structures and the involvement of many more people in decision processes than a purely technological or industrial engineering approach would bring about.

Some consequences

The remarkable developments in information technology – in the electronic storage and retrieval of information, in the speed and capacity of multi-access processors, in the power to transmit information via cables and satellites, in arrangements to link up computers in different parts of the world – have already had a considerable influence on economic and social life.

There have been, as with earlier technical innovations, considerable changes in the nature of work and in the location of employment. There are however fears and forecasts that modern IT – in particular the micro – will be more labour-saving than previous new technologies. Chips and robots, *it is said*, will reduce employment in manufacturing to less than 10 per cent by the end of the century, and the full range of ITs will have major labour-saving effects in banking, insurance, retail distribution, in central and local administration, and possibly also in education and the health services. Indeed, *it is claimed or feared*, the present high level of unemployment is a sign of things to come.

The causes of deep depressions such as we are experiencing now and experienced in the 1930s are many and complex. Suffice to mention two things: first, if current levels of unemployment were simply caused by an increase in the labour-saving nature of technical change, there would be a rise in the annual rate of increase in output per person employed, whereas

in fact there has been a fall; second, if there had not been a productivity slow-down in the early 1970s after an unusually long period of high levels of employment and productivity growth, there would not have been that great inflation in the second half of the decade which persuaded governments to shift the objectives of fiscal and monetary policies away from the primacy of the full-employment objective towards the reduction of inflation.

Bacon once wrote that prophecy should be restricted to fireside conversations between old men. However in view of the frequency of predictions that from now on chips and robots will make technological unemployment a far more serious and continuing problem than ever before, I have decided to prophesy away from my fireside. I am confident that there will be a recovery in growth and employment as there was after the great depression of the 1930s, but I do not pretend to know how far further reductions in the labour per unit ouput will reduce annual hours of work. Over the last 100 years 10 per cent reductions in labour per unit output have been followed by reductions in annual hours by about 3 per cent. Whether that relationship will persist will depend on the extent to which further innovations in consumer products and services sustain the demand for higher levels of consumption.

The role of raw materials in determining the locations of employment has become less important in recent years, and recent innovations in IT when combined with the dominant role of the service sector in employment will make the location of raw materials even less important in the future. Innovations in IT have also reduced the economies to be gained from concentrating head offices of Governments, major industrial and commercial companies, banks and law offices in large cities. Indeed the remarkable changes in communications that have occurred or are in prospect – interactive computers, electronic mail and other types of very rapid communication, videophones and cassettes – have led some observers to predict something like a return to the domestic system which preceded the factory system. There are already some examples, as in Rank-Xerox's Xanadu scheme, of even managers working from computers in their own homes. I would be surprised if that proved to be a significant sign of the times. Few workers are well enough housed, and those married women who go back to work after their children reach school age go as much in search of company as of cash, and would not find a keyboard and screen a satisfactory substitute for human company.

The power of modern computers when combined with contemporary intellectual technology has encouraged hopes that we are now in a position to overcome the shortage of Laplacian intellects and produce economic control mechanisms free of the crudities and compulsions of Soviet central planning. However, the recent performance of governments of the left and the right has been distinctly poor – better than the performances of governments in the 1930s but not very much better. The capacity to 'manage organised complexity' which Bell regards as one of the key features of the information society is still very imperfect.

Dangers

Developments in IT have generated extensive and awesome changes in military technology, and, indeed, many of the developments in IT were engineered for that purpose. Competition between the superpowers has been responsible for very rapid and wide-ranging innovations in IT. Over 200 years ago Adam Smith wrote of how in a competitive market system individuals in promoting their own self interest were guided as by an invisible hand to promote the public good. But unfortunately in military competition between the superpowers there is nothing remotely like a market or invisible hand to promote the public good.

Innovations in IT, whether promoted by military or civil R&D programmes, have increased the range and scale of international activities in industry and commerce. Money is moved from country to country to take advantage of even small changes in relative interest rates, or in anticipation of changes in exchange rates, and the 'management reach' of headquarters managers in transnational companies has been considerably lengthened. Currently there are strong pressures on national governments to change laws and procedures to allow the full growth of merged computer and communications technologies.

We should however be careful not to treat technology as an independent force in social and economic change. Advances in IT have facilitated the growth of international enterprises, but so too have tariffs on imports and the financial persuasions of many governments in support of their regional policies. Apart from the role of R&D in creating new technologies, many new technologies when created present us with alternatives. Modern IT has created opportunities for a growth in the efficient scale of centralised business organisations, but it has also created opportunities for more decentralisation of decisions and activities within large organisations, and for a growth in small firms via flexible manufacturing systems which reduce the cost advantages of large runs of standard products.

The capacity of networks of modern computers to provide government and government agencies with processed information has increased the appetites of government for more information. This together with the acute problems of limiting access to databanks has created fears for the maintenance of reasonable degrees of privacy. Such fears are well based, and it will be important to keep data protection legislation and procedures up to date.

There are fears too that in the information society a relatively small number of computer scientists and programmers will be able to take control of the key levers of society. So far the key problem has not been the concentration of power but the difficulty of producing a sufficient supply of programmers. By and large the effect of technical change has not been to concentrate power in small elites but to increase the size and range of elites. There are now fears that in 'the information society' there will be a progressive contraction of skilled jobs, and that this will create a large class, or sub-class, of Orwell's 'proles'. That could be a problem, though it is by no means certain that unskilled jobs will disappear, and

while the proportion of the population that will prove to be congenitally ineducable for a role in 'the information society' is not known, my guess is that it will prove to be quite small.

Tensions

In his analysis of the coming post-industrial society, Bell emphasised the displacement of intuitive business judgements by systems analysis and decision theory. Although he has over-estimated the role of systems analysis and decision theory, there has been a significant shift away from authority-oriented organisations towards performance-orientated organisations. This shift has been partial but is likely to be accelerated, though not completed, as a consequence of a further diffusion of information technologies. That is likely to lead to an increase in tensions within business organisations and government bureaucracies as the proportion of workers with higher education increases.

At the moment the supply of 'knowledge workers' in the labour force is unbalanced – in some fields there is a surplus – in other fields, most notably those most closely identified with recent developments in IT, there is a shortage. There are already conflicts between the aspirations and expectations of knowledge workers and the opportunities available to satisfy them. As the shortages of computer scientists, electronics engineers, programmers and systems analysts are reduced, these conflicts are likely to increase.

What will it be like?

The time has come for me to attempt an answer to the question in my title – how different will be life in the future?

The first part of the answer has to be that it could cease to exist, unless governments agree not simply to stop further competition in war technology but to disarm – if you like, to agree to become Luddites in their attitudes to modern war technologies. Given the proportion of R&D that is financed from 'defence' budgets in the USA, the USSR, the UK and France, such an agreement might well reduce annual rates of invention and innovation below recent levels, but most likely it would increase the sum of inventions and innovations by sustaining the process through time.

What of employment? Will the lives of an increasing proportion of the population be impoverished by technological unemployment? It is reasonable to expect further trend reductions in annual hours of work and increases in the average age of entry to the labour market, though whether recent trends in the reduction of ages of retirement will be sustained is doubtful. Fifty years ago, Keynes predicted that fifty years from now we would be striving to 'keep the old Adam at bay' by sustaining work of up to three hours a day. Some recent forecasts of the labour-displacing influence of IT make that production look quite plausible. However, the evidence for the prediction that technical change has become, or shortly will become, markedly more labour-displacing than in the past implies that labour-saving process innovations will accelerate and labour-extending product innovations die away. The evidence for any such prediction is very

slim. The incidence of technological unemployment has not increased significantly in the last 100 years and it should be quite possible for an information society to prevent any trend increase by adjusting education, the balance between product and process R&D activities, and hours of work.

Will the Alexandrian library survive? It has been calculated that at present rates of growth in books, journals and research reports, the library at Yale would need a permanent staff of 6,000 by the year 2040 to cope with annual accessions. Not even Yale would be able to afford that (or cope with such a monstrous collection of librarians)! The computerisation of abstracting and indexing services is one response to the knowledge explosion. If, as seems likely, there is a growth of specialised information centres to prepare and maintain databanks and transmit information through computer print-outs, facsimiles or video displays which licensed users will demand after online identification of need, the efficient use of information will require the linking of specialised centres in a national network. The biggest problem will be the creation of programmes that will allow the databanks to be used as knowledge bases. That is a major challenge to information scientists. In external appearance, and – apart perhaps from the addition of a substantial electronics annexe – in internal appearance, established libraries may not change greatly. But the use of them will, and even the most comprehensive of them will cease to own most of the world's recorded knowledge, though continuing, I hope, to provide access to it.

There will most likely be major improvements in educational technology and programmes which will extend opportunities for distance learning and self-paced learning. However, before concluding that, as Ilich proposed, education will be 'de-institutionalised', it is well to remember that the greatest innovation in the Open University – planned originally as 'the university of the air' – is not the use of the radio or TV or recent educational technology, but the use of course teams to prepare written courses which are then appraised through a continuing assessment of the effects of these course materials on students' learning.

I could go on, and on, to consider predictions that we are going to work ourselves into the thinking business (perhaps 'the thinking society' would be a better description of the trends Bell has tried to highlight); how far electronic fund transfers will eliminate those time-consuming substitutes for cash, namely, cheques and credit cards, and reduce the length of queues in supermarkets; whether the centrifugal or centripetal effects of IT are likely to predominate; and how soon – or whether – the *N*th generation of computers will incorporate artificial intelligence.

But the time has come to stop, and I will stop by asking whether, if we dozed off like Rip van Winkle and did not waken until 2004, we would be startled by the changes that had taken place. I suspect that we would be surprised as much by the time taken for the diffusion of technologies now known, as by new technologies that had not been mooted before we dozed off.

Information resource management in public administration: a decade of progress

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Paper presented at the 57th Aslib Annual Conference, 'Information Management: Potential and Practice', University of East Anglia, Norwich, England, 18–21 September 1984.

A decade ago, on 27 December 1974, the Congress of the United States passed a Law creating a commission to study why the paperwork and red-tape burdens being imposed on citizens, businesses and institutions by the US Federal Government, had become so excessive and burdensome – both in real economic terms and in terms of what we call in our country the psychological or government 'hassle factor'.

The Commission, which I joined at the outset as Studies Director, was charged by Congress to study and investigate statutes, policies, rules, regulations, procedures, and practices of the Federal Government relating to information gathering, processing, and dissemination, and the management and control of these information activities.

The Commission held its first meeting in January 1975 and went out of business two and a half years later, in the Fall of 1977. It grew to over 200 full-time and part-time staff, including consultants. It spent a little less than $9 million dollars, and made some 770 recommendations to the President and to Congress in its thirty-six final reports issued in late 1977.

Two main features set this Commission apart from earlier attacks the US government has made on the paperwork problem, which went back to the early 1800s and studied everything from pencils and paperclips to carbon paper and finally the introduction of the typewriter.

First, it was given a broader scope than just physical pieces of paper. It looked not just at forms and reports, but on laws, regulations, policies, and procedures governing information-gathering and dissemination. Even so, many critics of the Commission felt that it should have tended to its knitting and restricted its explorations to seeking ways to standardise government stationery stocks or to use microfilm instead of hard copy.

Second, the Commission's fourteen members were drawn from all walks of life, including two members of Congress, a consumer advocate, a union man, a businessman, a local government official, a school superintendent, a trade association executive, and several high-level Federal officials

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including the heads of the Office of Management and Budget, the General Accounting Office, and the Internal Revenue Service. In short, a broad spectrum of the 'high' and the 'low', from both the government's side and the public's side, was represented.

While most of the Commission's individual recommendations concerned themselves with an individual specific Federal agency programme, or report, or regulation, or policy, five studies undertaken were government-wide in scope and impact. In retrospect, the most important of those was the one called 'Information Resources Management'.

Early in the Information Management study it became necessary to distinguish between 'good' and 'bad' paperwork. Unfortunately the term 'paperwork' in general usage had come to carry mostly a negative or even pejorative connotation. Indeed, paperwork is 'bad' when it is duplicative, excessive, costly, contradictory, intimidating, or confusing. But paperwork is 'good' when it is useful and necessary to achieve national goals mandated by law, is collected in the most efficient manner, and serves multiple public and private purposes.

The Commission's Information Management study found that excessive paperwork is not a cause but a symptom of:

- government programmes that are organised with little regard for the way they will affect the public;
- programmes that are designed in ways that ignore opportunities to cut paperwork and information costs to the public without harming programme effectiveness; and
- programmes that fail to utilise the best information, information technologies and management techniques.

In addressing the broad causes of paperwork and information mismanagement, the Commission directed its efforts to a review of some of the factors precipitating these causes:

- substantial growth of government;
- overlapping government programmes;
- proliferation and fragmentation of information and programme requirements;
- the knowledge explosion;
- vague goals and objectives;
- the application of modern information-handling technologies, capable of handling massive quantities of data but inefficiently applied;
- the rising costs of data and information entry, storage, and retrieval equipment, software, facilities, and personnel who run this equipment.

In short, whereas the *unit* cost of the information-handling technologies was dropping significantly, when one added up the *total* costs of all the hardware, software, people, facilities, materials and supplies related to,

and supporting, information flows and holdings, the cost was enormous and the Commission felt strongly that such costs should no longer be buried in overhead or direct accounts as an 'invisible' or minor expense item.

The Commission then zeroed in on one of the fundamental underlying flaws in government's control machinery – the production and distribution of information itself. Because the production processes can produce information relatively easily, whether or not it is demanded or needed, much less used effectively, agencies had only a limited perception of what information they collected, much less for what purpose and how effectively it was used. Part of the reason was simply because bureaucrats had come to regard data and information collected from the public, or produced internally from its own information machinery, as virtually a 'free good' – free for the asking, free for the collecting, free for the storage, free for the processing, and free for the distribution and dissemination. And, indeed, at the end of the information life-cycle, nobody even cared about disposing of obsolete information that no longer was serving a useful purpose.

In the past, the typical response by a government study group to problems of this kind had been to institute paperwork or records management programmes. These were directed at dealing with the *physical* manifestations of the information proliferation problem, not to the information content of the paperwork and records. Generally, such programmes sought to simplify and consolidate forms and records, and to reduce the total amount of paper and files circulating throughout the agency's message streams. But the problem of information overload in an agency is not just a 'how to' problem, it also involves 'what' and 'why' problems. That is, the questions that are raised by the need for information collection, use, and value, touch not only on the procedural problems of *how* information can be more efficiently collected, stored, processed, and disseminated, but also on the substantive problems of *why* information is collected in the first place, and what practical value it has in helping to achieve successfully an agency's programmes and missions.

Although the term 'paperwork management' had been around a long time and was readily understood in a general sense by almost everyone, the Commission found that the term 'information resources management' (now often referred to by its acronym IRM), or simply 'information management', more accurately describes what should be the main target of control machinery. That is, the target should be on information requirements planning (sometimes called needs assessment), information evaluating, information budgeting, information accounting, information auditing, and information controlling.

All of those component functional areas, the Commission found, were common to all resources that the government manages – its human resources, its financial resources, its physical plant, and in the case of lands, wilderness, and wildlife, even its natural resources. The more the Commission thought about it, the more it came to the conclusion that, in

the end, while there are important differences between information and the conventional resources any organisation, public or private, buys or makes, and then uses to do its job, information was a resource much like any other and therefore should be subject to the same functional management disciplines, techniques, controls, and approaches used in the other resource management areas.

I suspect many or most of you by now have heard the rest of the story of what happened in the US. In December 1980, three years after the Paperwork Commission went out of business, the former President Jimmy Carter signed into law the Paperwork Reduction Act, Public Law 96–511, that makes IRM mandatory in the Federal Government. The law calls for a single senior information management official in every agency, the creation of IRM staff offices, sets quotas on how much information agencies can collect from the public (which has caused some controversy), requires periodic audits of major agency information flows and holdings – information systems, services and sources tapped from the outside or run entirely inside – and creates the so-called Federal Information Locator System which is a single central authoritative union catalogue – automated – of all of the flows of information into the government. The theory behind the system is that if an agency is planning a new information collection, it must first certify that it has checked the Locator system and found that no existing database or report can satisfactorily fill its needs.

But there is more to information management in public administration than the Paperwork Commission and the Paperwork Reduction Act. I would like to review briefly some other events that occurred in roughly the same timeframe (1974–1984) that we are considering.

First, in April 1977, the National Commission on Libraries and Information Science published a report to the President entitled *National information policy* that called for managing information as a resource not just at the agency or organisational level, but at the national level as well – as a national asset, if you will. The report complained that the absence of a well-articulated series of national information policies, including managing information as a national resource, was hindering the full realisation of the potentials of the Information Age.

At about the same time, reports coming from Professor Anthony Oettinger's Information Resources programme at Harvard University pointed to the convergence of the information technologies – most importantly computers and communications – underscoring the need to manage the *total* information technology resource in an integrated and synchronised manner, not as fragmented pieces. For example, today in the US Federal Government we are bringing the computer and telecommunications procurement funds together into a single, integrated information technology fund. Professor Oettinger also conceived of what he called a 'compunications' infrastructure.

In the summer of 1977, IBM in its national advertising said, 'today there is growing agreement that we have entered a new era, a post-industrial stage of development where the ability to put information to

use has become critical, not only to the essential production of goods, but to efforts to provide a better life for the individual as well'. And for the first time it mentioned the fact that 'This new era is being referred to with increasing frequency as the "Information Age".' Clearly IBM and the big hardware vendors were becoming worried over the 'garbage-in, garbage-out' syndrome. They realised that sound information management was in the vendor's best interests too – not just the user's. In short, IBM concluded that a satisfied and happy customer is a vendor's best customer – not an angry or confused one.

That same summer of 1977, the US Department of Commerce's Office of Telecommunications published the landmark nine-volume study authored by Dr Marc Uri Porat on *The information economy*, containing the now much-quoted statistic that over 50 per cent of the US labour force was engaged, not in industrial or agricultural or service work, but rather in information-handling work. By as early as 1967, according to Porat, information workers were earning over 53 per cent of the total US labour income. This finding again argued for the need for the US to manage this enormous information asset in the economy.

Xerox joined IBM in its national advertising, urging that information be looked upon as a valued resource, and managed, if we were to realise the potentials of the so-called Office of the Future. At one time Xerox was urging that the capital-to-labour ratio of office or knowledge workers be jumped from the present $2,000 per worker to $20,000, approximating the ratio of capital to blue-collar-worker in the manufacturing sector or the factory. However, Xerox is more cautious today, recognising that making nineteen copies instead of one copy from one of their machines does not necessarily make for 'productivity improvement'. In fact, unnecessary copying of paperwork is often unproductive or even counterproductive.

In December 1977, the First International Online Meeting was held in London, in recognition of a growing information community of converging interests in online database access, availability, marketability, and related issues, including transborder data flows.

In 1978 we began to see a number of professional societies and trade associations changing their focus or broadening their scope to embrace information management. We now have perhaps two dozen or more such groups around the world with some element of information in their titles, including Aslib.

By 1980 the cost of the US decennial census had tipped the $1 billion mark – thereby making it perhaps the most expensive single information collection ever attempted. Along with charges levied by local telephone companies for calls to the information operator, hardly anyone by 1980 could argue that information was a cheap commodity to buy and use.

In 1980, some of the country's leading international management and technology experts such as John Diebold and James Martin were admonishing businessmen to start looking at their information assets as strategic corporate weapons in the battle to win new markets, fight competitors, and fight government's excessive interference in their affairs.

Diebold called for the creation of a Director of Corporate Information in every Fortune 1000 company. *Computerworld* and *Infosystems* editors called for the establishment of a chief information officer. They also called for formal recognition of information as an asset. At first the accountants were a bit shy about thinking of capitalising information assets and putting the value on the balance sheet. But one by one articles have appeared in the literature suggesting how that might be done.

In the early 1980s the emergence in dim outline form of a new sector of industry – the information industry – began to reinforce the idea that if indeed information has value, *is* a commodity, and *can* be bought and sold in the market-place, then with growing awareness and appreciation of that value should come the manufacture of many new information goods. While the migration of products from print to electronic form and their sale through online database distributors was perhaps the most glamorous of this emerging industry segment's product lines, there began to spring up other sub-sectors and market niches for what are now called information brokers, information counsellors, information consultants, information retailers, and many others. Former Syracuse University Dean, Robert Taylor, in his forthcoming book on the value-added idea (*Value-added processes in information systems*, Ablex Publishing, Spring 1985), describes many new information goods and services that haven't even been prototype-tested yet.

If we stand back and look at the role of the information manager in the enterprise, and the responsibilities of the information management function, it is clear that this new profession must co-ordinate and synchronise the functional roles of three broad information communities that operate in what might be called the company's 'information environment':

(1) The users: the decision-makers and problem-solvers at all levels in the enterprise, whether professional or clerical, whether top or middle level management, irrespective of which department they may be in – staff or line.

(2) The vendors and suppliers, who are selling the enormous array of hardware, software, and information content 'packages'.

(3) The intermediaries – sometimes called the 'handlers' or 'processors' who, in Taylor's terms, 'add value' to raw data products, unmodified hardware, or untailored software, through some kind of enhancement process. Although we often abhor the term 'user-friendly' because it has become meaningless due to overuse in marketing and advertising hype, the term does get at this core idea of 'adding value' by streamlining, simplifying, customising, tailoring, abstracting, indexing, or indeed just reorganising data in more readily usable ways.

The information manager today is faced with an incredible opportunity to help bring order out of the chaos of proliferating hardware, software and information goods and services. I happen to think that he or she will rise to that challenge. Let me tell the story of one such information manager whom I met less than six months ago.

She works for one of the largest corporations in the US, and calls herself its Information Manager. She's in her late twenties, only five or six years away from her graduate degree. Her salary is in the high five-figure range. I asked her one day to tell me what she does.

'My company,' she began, 'recently paid for a round-trip, first-class airline ticket to bring me and four other corporate executives to Europe as part of an acquisitions takeover team. My job was to listen, identify the intelligence needed by the other members of the team, and put the necessary information in their hands as quickly as possible – sometimes within hours.

'Often I deal with extremely sensitive and confidential data,' she continued, 'so I can't talk much about my job. I kind of think of myself as what the military call their "G2" – the Intelligence Officer. My job is not just to deliver information in a passive sense. My job is to stick my neck out to assess its reliability and credibility, make sure it's packaged exactly as my principals are accustomed to seeing and using it, and make sure it was delivered to their desks yesterday. My own credibility is largely dependent on not abusing people's trusts. People who collect, process, and use the information that I deliver. If I had to go back to school again for post-graduate IM training, I'd probably go into the Military Intelligence Service!'

I wanted to share that little story with you because it underscores one of a series of summary observations which I list below – some conclusions, some prognostications, and some just plain hunches – about where we are going.

(1) Apropos our G2 information manager, I believe there is both a 'genetic' and an 'environmental' element to the information management movement. That is to say, I believe that we will increasingly find larger and larger numbers of young people filling *de facto* (whether or not *de jure*) information management jobs, and their attitude will be 'What's all the fuss about? Isn't this what everybody's doing? My job is perfectly understandable and natural to me, and I never did understand what all those fuddyduddies like Woody Horton were talking about with their painful and tortuous differentiations between information resources (plural) management, and information resource (singular) management.'

(2) It seems clear now that IM will be and is already being installed in two stages. Stage One is Information *Technology* Management (ITM); Stage Two is Information *Content* Management. I don't know of a single organisation that has successfully tackled both simultaneously, including our own US Federal Government Agencies, despite the law we have in place. The reason, it seems to me, is that the technologies are proliferating at such a rapid clip that it's all organisations can do to keep up with the latest hardware and software breakthroughs. They claim they haven't the time to manage, but we know they must.

(3) Next, and closely related to the last point, the explosion in hardware and software products and services is so dramatic, so powerful and so fast, that it is literally eclipsing the IM movement. Who wants to talk about

planning, managing and controlling information when we could run over to the computer store at lunch-time and watch the latest demo of the Macintosh MACPAINT package or dBaseII or Lotus 1-2-3 and Symphony? Nevertheless, we should stick to our guns, for the time cannot be far off when the mid-life crisis of the PC end-user will have arrived, when having become satiated on PAC-MAN, windows, electronic spreadsheets, mouses, and DBMSs, the user will cry, 'Is that all there is to the machine?'

(4) Three developments, one in hardware, the others in software, are leading the way to the technological and methodological underpinning that is so sorely needed by the IM movement. The hardware development is optical disk technology. One of the software developments is document-imaging software that allows full digitalisation and automatic indexing down to the data element level. The other software development is relational database management systems that can make large collections of data, documents and literature easily accessible and manipulable. The present file manager packages are simply inadequate to respond efficiently and effectively to the indexing, formatting, reformatting and other IM challenges of large information databases and collections.

(5) The territorial battles in private industry, academia, institutions and government must begin to simmer down. Right now everybody is jockeying for the position at the top of the IM pyramid. Should you be a generalist of a specialist? A mainframe MIS/DP director or a telecom expert? Where does OA fit in? What about the library records programmes, statistical staffs, micrographics, and all the rest? The atmosphere is too emotionally-laden right now to make calm decisions. But then, life has a habit of going on whether we like it or not. So we may find that should a power vacuum be allowed to exist for too long in the organisation, *others* will try to make these IM organisational decisions for us.

(6) The term 'IM' is a very useful, broad, umbrella term that may have the 'vice' of being too ambiguous but certainly has the offsetting 'virtue' of being a banner around which many professions, many people and many groups may rally. I think that that is a plus. Let the fussy academics and experts worry for the moment about technical definitions, scope and precise methodologies. And let us get on with raising the consciousness of just what IM is all about.

(7) We need to collect good case materials – what hospitals, which colleges, what companies, which government ministries have used IM approaches successfully? Or indeed unsuccessfully? Can their experiences be replicated? What lessons can we learn from them?

One of academia's biggest complaints – or perhaps I should say, excuses – for not moving more swiftly to design IM courses for undergraduate and postgraduate curricula is the serious shortage of good case material for instructors to use to develop syllabuses and courses.

In the last few years we have heard a new exhortation: Look upon your information assets as strategic corporate weapons to be used in the competitive battles. Now, instead of admonishing companies to manage their information just because that is the 'rational' or 'prudent' thing to

do, some are warning that if the company fails to look at information in this way it will lose to its competitors.

Whatever the incentives, whatever the motivations, whether by carrot or stick, my own feeling is that we are coming to recognise that information, next to people, is our most powerful resource. I cannot see how we cannot all gain – users, vendors, intermediaries, managers – by moving toward the Information Age as quickly as possible. To me, there has only been one path to that goal – IM!

It *has* been, I think, truly a decade of progress. But by no means do we yet have widespread agreement on just what IM means, much less how it works. But after all, that is what groups like Aslib are all about. I wish you every success as you continue your quest. We in the US will surely learn from you, and hope that in the years ahead, we can share results with one another.

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A holistic approach to the management of information

Peter Vickers
Aslib Research & Consultancy

Paper presented at the 57th Aslib Annual Conference, 'Information Management: Potential and Practice', University of East Anglia, Norwich, England, 18–21 September 1984.

1984 has turned out to be a very interesting and instructive year. I was given a special assignment, the essence of which was that I should do things to consolidate and extend Aslib's capability in the field of information management, following its change of name.

One product of this activity has been a number of papers for conferences or for publication in journals. In between times, I have continued to do a variety of consultancy projects. This frequent shuttling between the airy realms of information management theory and the real world and its problems has been rather confusing at times, but, like I said, instructive and salutary.

Our Director was keen from the beginning that we should establish an agreed definition of Information Management (IM). Early in the year, we came up with some brilliant answers, like:

Information management means the management of information

closely followed by the more profound

Information management is about
People using Techniques to manage
Information resources
In various environments.

Classic 'so what' statements of that kind do not cut much ice when trying to convince a managing director that the firm's whole approach to information handling needs to be changed if it is to function effectively.

We can fairly claim today that we have a good idea of how information management should be practised, and how it should relate to the management of the organisation as a whole. We know what a good information manager should look like – although alas there are not many about yet. But we still have a lot to learn about how to introduce IM in a systematic, reasonably painless way. As it was with medicine not so long ago, it is usually possible to relieve the symptoms of bad IM, but very difficult to actually cure the disease.

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The purpose of this paper is to show the variety and complexity of the problems of introducing IM. I could have used any number of organisations as examples, but the National Health Service (NHS) is a good big one that we have got to know quite well, so I have used it as my model here.

The projects

Aslib's knowledge of the NHS stems mainly from two consultancy projects carried out over the past three years. The first and largest of these was commissioned by the Department of Health and Social Security (DHSS) and one of the Regional Health Authorities. It was felt that better use could be made of information technology to improve the flow of information between the DHSS and the NHS, and within the NHS. We were asked to study these flows and to recommend a strategy for introducing appropriate technology which would permit cost-effective transmission of information. The main end-product of the project was a report, *Introducing IT in the District Office*, published by the King's Fund Centre, which achieved wide distribution and (we hope) some enlightenment and impact.

The other project was much smaller, and was concerned with the possible future development of services provided by the King's Fund Centre Library. It is relevant here only because it gave us an opportunity to have a second, closer look at library and information service provision in the health sector.

The structure of the NHS

Figure 1 shows the general structure of the health care sector, with the DHSS providing the funds and laying down policy; the Family Practitioner Committees (FPCs) looking after the general practitioners; the Regional Health Authorities (RHAs) planning and co-ordinating the provision of services within the fourteen Regions; the District Health Authorities (of which there are 193) planning and managing hospitals, clinics and other services locally. Perhaps the best indication of the scale of the NHS is the number of people it employs, which is now over 1 million.

The Districts have a pivotal role, as they are closest to the action. Their task is to administer the available facilities, and to draw up and implement strategic and operational plans for extending those facilities where necessary, subject to guidelines laid down by the Regions. The Regions co-ordinate the plans of their Districts, subject to policy handed down by the DHSS, and within the inevitable financial constraints.

Information flows in the NHS

Figure 2 shows the main information flows that we identified, and which enable this vast apparatus to function.

Flow A is *operational feedback*, carrying data on current operations such as costs, manpower and clinical activities.

FIGURE 1. *General structure of the NHS.*

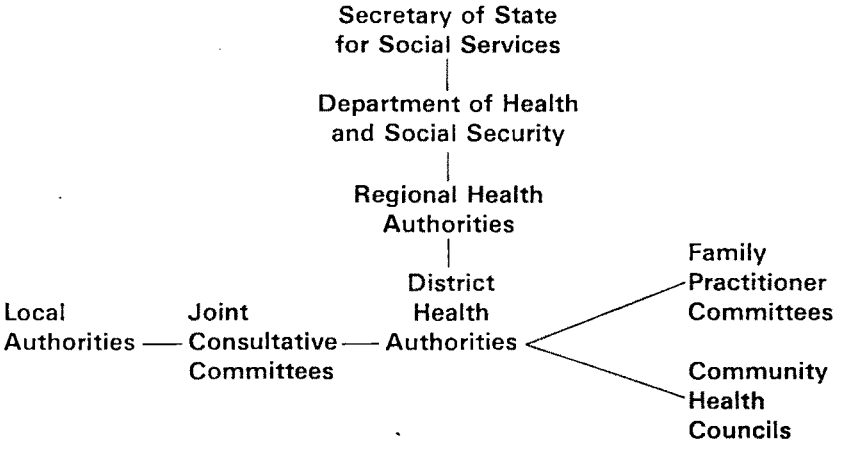
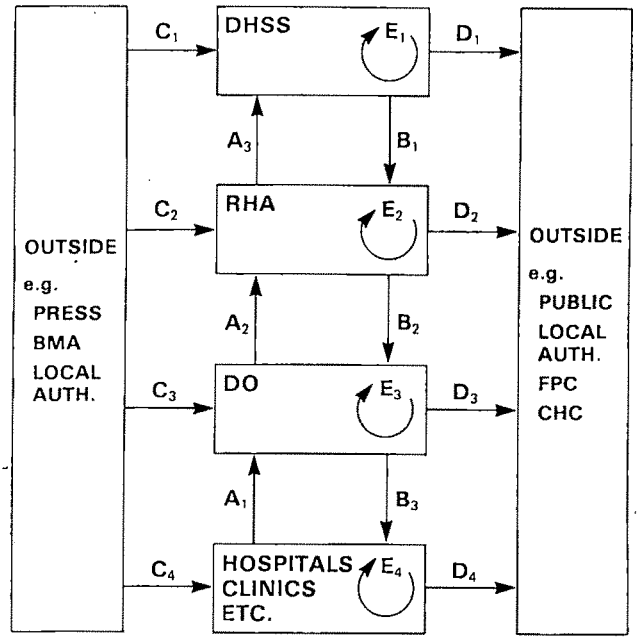


FIGURE 2. *Information flows in the NHS.*



A OPERATIONAL FEEDBACK
B "LINE" COMMUNICATIONS
C EXTERNAL INFORMATION INPUTS
D EXTERNAL INFORMATION OUTPUTS
E INTERNAL PROCESSING (OF A, B, C, D)

BMA = British Medical Association
CHC = Community Health Council
DHSS = Department of Health and Social Security
DO = District Office
FPC = Family Practitioner Committee
RHA = Regional Health Authority

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Flow B we labelled *line communications*, which consist of policy decisions, forward plans, resource allocations, and instructions from higher tiers.

Flow C conveys *external information inputs*, which are collected as an aid to decision-making on any aspect of an organisation's activities.

Flow D conveys *external information outputs*, a combination of public relations, health education, and liaison with other bodies such as local authorities.

Flow E relates to *internal information processing* which is required within each tier to process inputs for local use, storage or output.

This diagram represents information flows very much at the macro level, and only shows one slice of a very large pie. It should in fact be a circular diagram with fourteen Regions connected to the DHSS, and families of Districts linked to each Region, and so on. It also unfortunately ignores information flows between Regions and between Districts, but it is complicated enough as it stands.

It would be interesting, if space permitted, to zoom in on each of the boxes and look at the flows within the organisations at each level. The bottom box is a particularly gross oversimplification because it represents a number of hospitals, clinics and other facilities, many of them complex organisations in their own right. I shall return later to the particular case of the District Office, but for the present, let us look in more detail at each of the flows in Figure 2.

Operational feedback

As might be expected, this type of flow accounts for the largest volume of information, and gives rise to great problems. With a large complex organisation like a Regional Health Authority (let alone the NHS as a whole) the systems for handling operational data are (a) very big, and (b) absolutely central to its proper management. A large proportion of this data is of course generated within clinics and hospital wards, as patient records, and records of the use made of hospital facilities, staff resources, and supplies. It fills astronomic numbers of forms, the contents of which are summarised on other forms, which in turn get further aggregated as the information moves up through the tiers. Much of it gets processed by computers – mainly at the Regional level, but also in the Districts.

In order to review and rethink the overall design of these systems, and to lay down guidelines for their operation, a powerful body was established called the Health Services Information Steering Group, more commonly known as the Körner Committee. This Committee investigated and reported on the information requirements of each function of the Health Service, finishing its work this year. The scope of its concerns is indicated by its constituent working groups, each of which reviewed information systems relating to a particular area of work. These were:

A. Hospital facilities used by consultant medical staff;
B. Laboratory and scientific services;
C. Paramedical services;
D. Community health services;
E. Health service manpower;
F. Health service management accounting;
G. Patient transport services;
H. Miscellaneous, completing the work of the other groups.

One of its earlier recommendations was that each District Office should appoint a District Information Officer, mainly to look after the collection and processing of data rather than technical information.

Most of the computing power in the NHS is at the Regional level, each Region having a large computer centre, and pursuing its own Regional strategy for the development of computer facilities, within the context of a national plan. The advent of cheap information technology, at a time when the Districts had been given a greater degree of autonomy anyway, has meant that a lot of microcomputers and word processors have been installed in District Offices outside the scope of Regional plans.

Where is the information management in all this, you may ask. A good question! The truth is that responsibility for information management in this area (of operational data) alone is widely dispersed. There are of course Regional Computer Managers, and Regional Management Services Managers. At the District level, the District Information Officers may have some expertise, but they have little authority. It could be said that the Körner Committe with its secretariat represented a kind of information management, but it has gone now. The ball is in everybody's court.

Line communication

It was in this area that the need for the Aslib IT project was first perceived. A substantial volume of what is called guidance material is generated within the DHSS, such as Health Circulars, Health Notices and Hazard Notices. This is distributed to Regions, which in turn distribute it to Districts, who are supposed to circulate it internally and distribute it as necessary to hospitals, health centres and so on. Not surprisingly, there were problems, and cases where important information did not reach its intended recipients. Could these problems be alleviated perhaps, if the information was distributed via an internal viewdata system or some other form of electronic network? Well, perhaps they could, if all the Districts were supplied with suitable terminals and persuaded to consult them regularly, and providing that this information, much of which is at present contained in rather fat documents, could somehow be squeezed into a viewdata format.

Beyond the distribution stage, there were also problems of local storage and retrieval of all this documentation, some of which is often needed for reference during the planning process.

Here again, the management responsibility for ensuring that this information reaches the people who need it, is dispersed along the supply chain. And here was the DHSS dutifully trying to fulfil *its* information management responsibility by looking to technology for a solution.

External information inputs

This information flow relates not simply to published literature from the outside world, but to *all* information that comes into the Health Service from external sources. Much of it is conveyed orally, through meetings and conversations. Lots of meetings and conversations go on in the Health Service. I do not propose to discuss further the general aspects of communication within the Health Service. There is quite a lot to be said, however, about the systems for disseminating, storing and retrieving published information.

The first thing to note is the several different user populations to be considered, each requiring different information inputs:

medical staff – qualified and in training
nurses – qualified and in training
managers and administrators
other specialists:
engineers, supplies officers, personnel officers, equipment technicians, etc.

The varying needs of these different groups have led to the existence of several different kinds of library and information services, mostly working quite independently of one another.

First there is the DHSS Library, based in London, which recently made its computerised database, DHSS-DATA, publicly available via DataStar and Scicon. This database will be very important to the NHS as a whole, because it provides a central retrieval system for all that guidance material I mentioned earlier. As a document collection, however, it is intended for the use of the DHSS only.

Most of the Regions have Regional Librarians, some of whom are in charge of Regional Libraries. Others simply co-ordinate the various libraries and information units within their Regions. The library facilities within Regions vary widely, and generally include a mixture of services attached to hospitals, and set up to serve the different user groups. Online searching is used fairly widely, but many of the smaller libraries have problems in obtaining the documents they need.

Some of the Districts have libraries, usually set up to provide a service to the administration. These tend to have responsibility for the main office filing system, and the local collection of guidance material, as well as books, journals and reports. The District Information Officers now appointed in most Districts are in some cases also establishing local library services (reinventing librarianship in the process).

A glaring feature of the situation is the wide variation in the level and quality of library and information service provision between one Region

and another. Enormous efforts have been made by a few keen individuals, mainly the Regional Librarians, to establish some common ground, to set up better co-ordination of services and generally to raise the standard of these services, but it is an uphill struggle in the face of desire to preserve the autonomy of each Region and District.

External information outputs

As I said at the beginning, this category covers public relations, health education, and liaison with other bodies such as local authorities, Community Health Councils and Family Practitioner Committees. This flow is particularly important to such a large, publicly-visible organisation as the NHS. The outputs differ considerably from the top to the bottom tiers shown on my information flow diagram.

I do not propose to say anything about the public relations function. So far as health education is concerned, it is worth noting that there is a school of thought which says that if more were spent in this area, less would need to be spent on medical treatment. In Wessex Region, a particularly successful venture has been their 'Help for Health' project, which established an information service on voluntary bodies and specialist agencies relating to health care. This was initiated by the Regional Librarian – another piece of good local information management.

Internal information processing

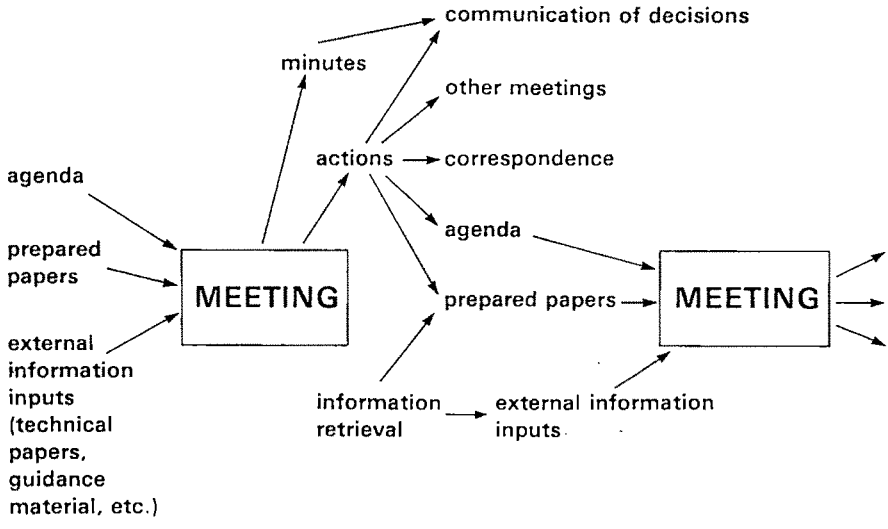
This is where the picture gets really complicated, because of the number and diversity of information systems, formal and informal, at each level.

At the District level, one can (in theory, at least) regard the District Office as a single information system with the inputs A1, B2 and C3; and the outputs A2, B3 and D3. From the viewpoint of good information management, it is in fact *desirable* to think in these terms, if we are serious about achieving properly integrated information handling. In practice, however, we have to accept that there is a great number of subsystems within the District Office (DO), some relating to different functions, and others to different disciplines.

Much of the work of the DO is to do with planning or project-based activities, which are carried out within the framework of an annual planning and review cycle. These activities are the main preoccupation of the many committee meetings that take place. Senior staff in the District Office may spend as much as twenty per cent of their time on committee work. Figure 3 shows the pattern of activity relating to committees, with the various documentary inputs and outputs. Several kinds of information processing are involved here, and there is a crying need for information management expertise to make sure that efficient techniques are used.

The day-to-day management and administration of operations in progress includes such tasks as staff management, budgets and performance monitoring. These tasks generally entail a lot of written and spoken

FIGURE 3. *Pattern of committee activity.*



communication with individuals and groups, but limited reference to recorded information.

Turning now to the subsystems relating to different disciplines, there are three main groups of people in the District Office:

(1) specialist health professional administrators such as the District Medical Officer and the District Nursing Officer;
(2) special administrators such as those in finance, personnel, works and supplies;
(3) general administrators including the District Administrator, and Unit Administrators.

The members of the first group must keep up to date in their respective specialisations, and therefore need to receive and note a large amount of information from within and outside the NHS.

The operational information systems of the second group (works, finance, personnel and supplies) are to some extent determined from above, and are generally quite well developed, in some cases using computer systems adopted as a national standard.

Within the third group, central administration is at the hub of the District information system, and by default exercises what little information management there is, for the District as a whole. It is the primary recipient of much of the documentation from the DHSS and RHA levels, and therefore has to pay the greatest attention to filing and dissemination.

To sum up, in this area of internal information processing, there is within a District a multiplicity of information systems, large and small, formal and informal, manual and computerised, mostly with little or

no mutual compatibility. There is little evidence of anything remotely resembling information management. There is increasing interest in the use of information technology (IT) for handling information, and the District Information Officers are often the best available local expertise for introducing IT.

A general diagnosis

I hope that I have said enough about the NHS to give a general picture of its main information problems. Out of all that, I think that the following are the main points to be noted, and the parallels that can be drawn with what goes on in other organisations:

(1) First, I think it is important to recognise those multi-dimensional information flows, all of which need separate and collective consideration as to the best techniques and the best media to be used for transfer, storage, and retrieval. Information management is about all of these information types, not just flow C.

The same basic information flows can be identified in any organisation, so that one can see a similar pattern in any industrial firm. One would normally map them, however, on to a more detailed picture of the organisational structure, which would also show the complex pattern of flows between different departments or functions. Examples of these flows could be found in a District Office, which itself has an hierarchical structure based on the concept of a District Management Team and a series of Unit Management Teams.

(2) The development of information systems is patchy, some employing the most advanced technology while others are still primitive. Systems for handling data are generally more favoured than those for handling text. Certainly, one finds the same inconsistency in many industrial and commercial firms.

(3) There is compartmentalisation of information systems, and of information workers. The general attitude of mind is that published literature (library material) is quite separate from working documents (committee papers and correspondence) which in turn are quite separate from operational data and statistics. Again, one finds exactly the same thing in other organisations, with the same entrenched views on the separate roles of librarians, information scientists, statisticians and computer specialists.

(4) In the NHS, there are problems of co-ordination of system development at the Regional and District levels. This has been aggravated by the availability of (relatively) cheap information technology, which the District Offices are keen to apply, on their own initiative. The same clash of interests can be found in industrial organisations, between individual departments who want to introduce their own local IT, and the central computer department.

(5) Finally, there is a lack of real information management at all levels. True, in the case of the NHS, it can be said that the work of the

Körner Committee was an excellent step in the right direction. It has done a great deal to raise awareness of the need to take information seriously, and has done an enormous amount of groundwork that will greatly improve the next generation of management information systems. So far as I know, however, it will leave behind it no permanent provision for management of the information resource, nor is it easy to see where the necessary authority to apply such management will spring from.

So how do we put it right?

It is not difficult to diagnose what is wrong with an organisation's information management. What is difficult, whether we are talking about the NHS or a small firm round the corner, is telling them how to put it right.

In our larger industrial firms, good information management is coming about through successful combination of the skills of information scientists and computer specialists, allied to sound management capability. I can think of examples where a first-class information scientist heads up a department that includes computer services, the technical information unit and library, the central registry, and perhaps a unit concerned with office automation. In other cases, a similar mix of services is under the direction of a computer specialist.

These successful combinations of information management skills from previously separate functions tend to happen where the separate pieces were each well established in the past, and recognised each others' contribution. In much of medium-sized industry, however, the only part of the organisation with sufficient clout to drive it towards acceptance of IM is often the computer department and/or whatever department is responsible for introducing office automation.

Coming back to the NHS, I mentioned earlier that it is not well organised so far as traditional technical information services are concerned, and in fact very few information scientists are employed there. So there is no firm base on which to build up an information management capability in that professional area. The most likely scenario for the future is that information management power will be drawn inexorably towards the management services function, or more specifically, the computer department.

IT is not enough

There is a school of thought which says, 'wheel in the information technology, and let the information management take care of itself'. And I must admit that in some cases, it can work after a fashion – slowly. The availability of low-cost information technology, which has paved the way for distributed computer processing of information, has brought many organisations to a point where they realise that redesigning information

systems and making them work compatibly is not as easy as it might seem. They reach a stage where they recognise, if only vaguely, that they need to assign responsibility at a fairly high level for these matters. Some of them then begin to reinvent information management.

I believe this to be an unsatisfactory way of doing things. The design and management of information systems should be based on what the organisation needs in order to function efficiently, not on the hardware it happens to purchase. Ideally, every organisation should formulate its own IM strategy, that is, a strategy for the development, implementation and management of information systems of all kinds. A prerequisite, of course, is that managers should be convinced of the need to treat information as a key resource – which will not be easy.

A holistic approach?

Time is running out, and I must face up to the rash promise of my title. What do I mean by a holistic approach to information management?

Well, in the first place, I wanted to bring home the point from the NHS case study that IM is required at all levels in an organisation. It is not just a matter of designing better systems, or buying the right database management system (DBMS) package. It is not just a matter of appointing an information manager. Looking after information properly has to be taken as a matter of course throughout the organisation, in the same way that we take it for granted that money should be properly accounted for.

That, in brief, is what I mean by a holistic approach to information management. It is an approach based on a corporate view of information as a resource, recognising that this new element of management is not something that can be bolted on to the organisation overnight, but that will take time to graft on to traditional attitudes and management processes.

Aslib's impressions of the way that the concept of information management is spreading in the UK change almost daily as travellers pass through Information House bringing us news from our far-flung members. Sometimes it seems that the idea has really caught on, and that everyone is playing our tune. There are advertisements for information managers in the Sunday papers; we come across a trail-blazing article on the subject by some eminent spokesman in one of the management journals; or we find that a new IM course has been launched at the London Business School. The next day, perhaps, the bubble is burst when we find ourselves talking to a captain of industry whose idea of information management is making a decision to buy some manilla folders from Rymans. I have seen many firms where it will be a long, long time before there is any real progress towards an understanding of these matters.

A holistic approach recognises that real 100 per cent IM will entail a serious reassessment of the relative value of the resources on which an organisation depends. It means a profound change of thinking for many managers, and we have to do something to get that particular ball rolling.

Information management: an Australian photomontage

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Introduction

One of Australia's publishing success stories of 1982 was the coffee-table book, *A day in the life of Australia.* One hundred photographers were sent to different locations throughout Australia. Their assignment: *Take pictures.* The result is a national album showing people in country towns, capital cities, isolated cattle stations, doing what they would normally be doing at different times of the day. The photographs selected by the editors for publication could not hope to provide an exhaustive overview of Australia and Australians; nonetheless, those who browse through the pages get the feeling they've shared a significant part of Australian life.

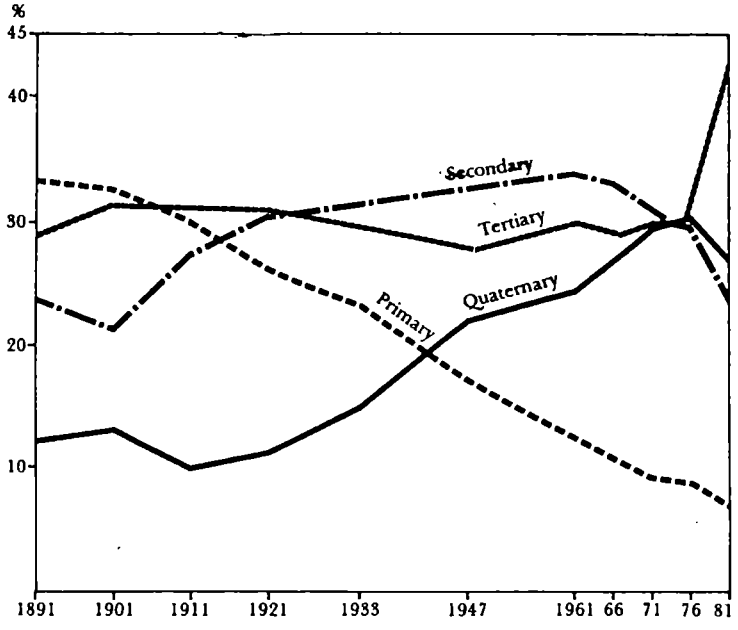
My approach to information management will be similar. For a country as diverse as Australia, it is impossible to summarise what is happening in every state, let alone in every corporation or government department. What follows is an in-depth 'portrait' of developments nationally, plus 'snapshots' of developments in some states, in some commercial organisations and statutory authorities. The intent is to describe a few systems and services in sufficient detail to share an understanding of the background and development of information management in Australia, its potential and problems.

For Australian developments to be appreciated, they must be set in a geographical as well as historical and political context.

Australia is roughly thirty times larger in size than Great Britain, but contains only one-quarter of Great Britain's population. It is divided into six states and two territories. The capital cities comprise the majority of Australia's population, although only three (Sydney, Melbourne and Brisbane) exceed one million. All are located on or near the coast. Much of the interior of the continent gets little rain, and is given over to wheat, sheep, and kangaroos.

Because Australia is an island continent and located in the Southern Hemisphere near South-East Asia, Australians experience a certain sense

FIGURE 1. *Four-sector analysis of the Australian labour force, 1891–1981, in percentages. From Jones,* Sleepers awake![36], *p.60.*



of isolation from the Western political and cultural mainstream. They also feel the effect of the 'tyranny of distance', a phrase coined by historian Geoffrey Blainey.

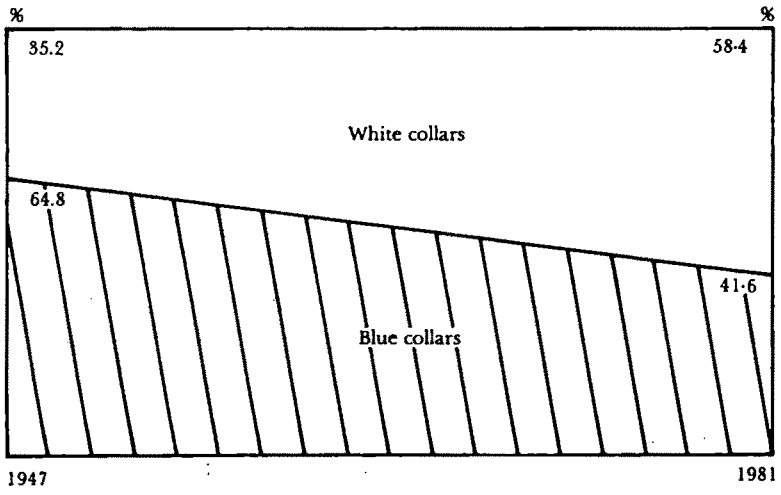
Australia as an information economy: *in the photographer's studio*

On the surface Australia is very much the same as Great Britain. Buildings are modern, consumer goods are plentiful. Unlike Third World countries, technology is obvious and dependable: phones work, elevators work, photocopy machines work. Pharmacists use microfiche readers to check stock, major supermarkets use computers to read bar-code labelled prices, and airlines use online terminals to make bookings. Shopping centres sport electronics and home computer outlets. For tourists who stay primarily in the capital cities, the most vivid impressions are the friendliness, the 'Strine' accents, and the quantity of beer consumed.

However, Australia is different from Britain in many ways, despite the historical links. Colonisation did not begin in Australia until 1788; federation of the colonies into Australian states did not occur until this century, in 1901. By then, most states had already established distinct and separate systems of education transport and commerce.

Barry Jones, the Minister for Science and Technology, has noted in his book *Sleepers, wake! Technology and the future of work*[36] that Australia

FIGURE 2. *Changes in white-collar and blue-collar employment in Australia, 1947–1981, in percentages. From Jones,* Sleepers awake![36], *p.78.*



was probably the first 'service-based' economy anywhere. Unlike Britain, where industry was dominant for decades after the decline of agriculture, Australia has never experienced manufacturing as the largest employer. The economic trends in the Australian labour force from 1891 to 1981, based on a four-sector analysis (agriculture and mining in the primary sector, construction and manufacturing in the secondary, tangible services in the tertiary, and information and printing in the quaternary) are shown in Figure 1. The relative increase in white collar over blue collar employment within the past few decades can be seen in Figure 2.

Australia ranked below only the United States (41.1 per cent) and Canada (39.4 per cent) in the early 1970s, with 39.4 per cent of its economically active population in information occupations. The 1981 figure for Australia has risen to 41.5 per cent. The United Kingdom ranked fourth at 35.6 per cent.[40]

Using the more traditional three-sector analysis, the largest area of employment growth in Australia is acknowledged to be the information-related component of the services sector.[48]

Information technologies in Australia: *Cameras at the ready*

Because Australia is so sparsely populated – although tourists caught in Sydney rush-hour traffic might disagree – and because most technologies have had to be imported, Australian developments have come later than in the United States or Great Britain. For example, the Transcontinental railway from Perth to the Eastern States was first laid in 1917. The Eyre highway, connecting Perth and Adelaide, was not paved until 1976. Information technologies have followed the same pattern.

Black and white television transmission was introduced in 1956; colour, not until 1975. The government is at present planning the introduction of radiated subscription television services, but has postponed indefinitely any consideration of introducing cable television.

In the past couple years, private videotex systems began operation through corporations such as Computer Power and Control Data. Viatel, the first public access videotex system, is scheduled for introduction early in 1985. The Australian equivalent of Prestel, Viatel will be provided through Telecom, the statutory authority responsible for telecommunications facilities for Australia. At present, Telecom has invited potential information providers access to the system at reduced rates during the trial period.

AUSSAT, the AUStralian national SATellite system, will also be launched, literally, in 1985 – one satellite in July and one in October, via the NASA Space Shuttle. Fifty-one per cent of the ownership of AUSSAT will reside with Telecom. Major 'gateway' earth stations are under construction in each of the capital cities; private users will also be permitted to establish their own earth stations and terrestrial links.

AUSSAT has been designed to complement the terrestrial system operated by Telecom. Typical expected uses will include distribution of television and radio programmes by the Australian Broadcasting Corporation as well as commercial operators; voice and data services for the Departments of Aviation and Transport; private and public sector data transmission; and provision of telephone, TV and radio services to the remote areas of Australia, to be known as the Homestead and Community Broadcast Satellite Service (HACBSS). At present almost 300,000 people are outside the normal coverage area of existing television and radio transmitters.

Since 1978, a range of overseas databases has been available to Australian users through MIDAS, the Overseas Telecommunications Commission's (OTC) data transmission link. Prior to this, standard overseas voice transmission line charges prevailed. The bi-directional mode, or 'reverse MIDAS' as we in Australia tend to think of it, has been operational for the past eight to ten months from a number of locations, including the UK, the US, Singapore, and Hong Kong.

AUSTPAC, the AUSTralian PACket switching network, was introduced in late 1982. MIDAS is operational only with a direct tie-line to the host, or with the host connected to AUSTPAC; there is no connection into the telephone network.

OTC also offers an international electronic mail service, MINERVA, linked to DIALCOM networks worldwide again through MIDAS. In addition to electronic mail, the MINERVA system includes diary, word-processing interface, spelling check, notice-board, forms processing, conference, phone-messaging, online directory facilities, and from 1985, world news and international airline guides.

AUSINET (AUStralian Information NETwork), Australia's major commercial online search service, was established by Australian Consoli-

dated Industries Computer Services (ACICS) in 1977. Initial users were principally government and academic libraries and researchers, but over the past two years, the database mix has changed to reflect the needs of the commercial sector.

The thirty-one Australian databases at present available on AUSINET comprise over a half million records, covering subject fields from accounting, agriculture and art, to sports medicine, taxation and water-resource management. The format of the databases varies, and includes bibliographic records, factual material, full text, numeric data, and case digests. The software package used is IBM's STAIRS, although ACICS has undertaken major enhancements.

ACICS has recently signed a number of agreements with major Australian publishers, including John Fairfax Ltd, Commerce Clearing House (CCH), Rydge Publications, and Lipscombe & Associates, to provide electronic publishing services.

The National Library of Australia has developed a national bibliographic network called the Australian Bibliographic Network (ABN), based on the Washington Library Network software. At present, over eighty libraries are contributors of original cataloguing input to the database, and another 100 libraries dial-up only query access. ABN at present contains over three million records, including BNB, LC and ANB (Australian National Bibliography) MARC files, with over two million holdings statements recorded.

A second national bibliographic network, the Australian Schools Cataloguing Information Service (ASCIS), provides automated cataloguing records and authority control for a range of both state and independent schools throughout Australia.

In response to these developments, an Australian Telecommunications Users Group (ATUG) was formed in 1981 with the aims of providing a forum for determining users' requirements in the telecommunications field and conveying these requirements to government, communication organisations and other interest groups. ATUG's philosophy is that all users should have a reasonable freedom of choice to benefit from modern communications technology and to utilise the best possible facilities and services at the lowest cost. Its expanding membership includes large, medium and small companies, non-profit and government organisations, telecommunications carriers, and individuals.

The Australian Database Development Association (ADDA) was established in 1982 at a meeting of representatives of database producers and individuals interested in the development of databases. The objectives of this Association are to provide a forum for the exchange of information, to formulate policies on the development of Australian databases, and to provide a focus for communication with government and users. ADDA publishes a bimonthly newsletter, holds seminars and workshops, and has published a directory of publicly available Australian databases. ADDA invites both individual and corporate membership; of the twenty-four institutional members at present, over half are from the private sector.

Overall, the Australian information-technology-related market is presently about $3.2 billion. By 1992, it is estimated that it will have doubled in real terms. Nonetheless, the utilisation of information technology in Australia is below the OECD average, and there have been few commercially successful information technology (IT) product developments. The vast majority of IT products are imported, or assembled in Australia by foreign-owned companies. About fifty companies produce computer hardware, with about 900 firms involved in software and systems development.[59] In summary, then, Australian technological developments in the information field have derived primarily from British and American models. They have been adapted in response to local conditions and situations, but have lagged some years behind similar implementation overseas.

Information technology and information management: *Federal positives and negatives*

Developments in information technology and information management must be viewed in the context of federal government policy, particularly since the mid 1970s.

The Scientific and Technological Information Services Enquiry Committee (STISEC), reporting in 1973, expressed concern over the lack of access to scientific and technological information. Of 642 scientific staff employed in government establishments, 17 per cent had no ready access to a library, 33 per cent had no literature searches available, 59 per cent did not have selective journal circulation, and 97 per cent did not have any SDI services available to them.

The STISEC report recommended that a national scientific and technological information system should be created, not in isolation, but as an integrated part of a total information system – that information system to be part of the responsibility of the National Library of Australia.

A proposal for an Australian Library Based Information Service (ALBIS) was referred to an Interdepartmental Committee (IDC). As with most proposals referred to IDCs, this one came to naught.

In 1974 the Whitlam Labor government commissioned a Royal Commission on Australian Government Administration, the result of which has become known informally as the Coombs Report after its Chairman, Dr Herbert Coombs.

In its examination of special problems of administration, the Coombs Report[55] noted that:

> 'one in ten of the submissions received by the Commission was critical of the way information is gathered, used and disseminated, or not disseminated, by the bureaucracy. There were complaints about the lack of co-ordination of the various services which provide information either to the public or to the administration, such as libraries, registries and information sections'.

The Commission identified and made recommendations on several aspects of information collection and use: information for administration, information for policy, registries, automatic data processing, statistics, public access to information, Freedom of Information legislation, departmental information services, information for Parliament, and libraries and archives.

To facilitate co-ordination and review of policy and administration, the Commission recommended the establishment of a Commonwealth Information Advisory Council, the primary purpose of which would be 'to advise the Commonwealth government on the development of a comprehensive information policy, to review significant technological developments, and to provide a forum for consultation between specialist information agencies'.

The Coombs Report was published in 1976; unfortunately, the government had changed in 1975.

In 1978, a Task Force on Departmental Information was set up by the Fraser Liberal Government within the Department of Prime Minister and Cabinet to examine the public dissemination of information on government programs and activities. This Task Force reported in 1980, although their report was not published until 1982.[58]

The Task Force deliberately chose not to consider broad issues such as the role and potential development of major specialised repositories of information such as the National Library; they did note, however, that only 0.5 per cent of survey respondents thought of libraries as organisations able to provide information about government services. As opposed to the Coombs Report, the Task Force reinforced a separation between various types of information resources, concluding that public information needed a different organisational and management structure from the information supplied by libraries for internal consumption.

In 1978 the Fraser Government also established an Information Technology Council within the Productivity Development Division of the Department of Science and Technology. This Council, with representatives from government, industry, unions and tertiary education, was to play an advisory role. Its life was short; it got the chop in 1981 on a recommendation from the Lynch Committee (known in the press as 'the Razor Gang'), which was looking for means of cutting government expenditure.

Nonetheless, a National Technology Council still exists, receiving minimal funding from the Department of Science and Technology. The purpose of this transmuted Council is to promote a greater awareness of information technology at all levels – from school children to academics. To this end a number of publications have been released, including five annual volumes of *Technological change: impact of information technology*, which bring together essays commissioned from prominent Australians. The Council has sponsored and co-ordinated an annual Information Technology Week since 1979, in order to acquaint 'people in the street' with the applications of information technology. By 1984, this event has become Information Technology Month, with over 1,600

different activities scheduled by State Committees throughout Australia, including demonstrations, short courses, and Information Technology House, a model home equipped with all the latest electronic gear.

The Freedom of Information (FOI) Act 1982 commenced operation on 1 December 1982, after a process of debate, preparation, criticism, and modification that had lasted more than a decade. The merits of FOI legislation were considered not only by the Coombs Royal Commission, but also by two public service interdepartmental committees, the Senate Standing Committee on Constitutional and Legal Affairs, and the community – including a submission by the Library Association of Australia.

The FOI Act establishes for the community a legally enforceable right of access to information held by Commonwealth ministers and government agencies, gives persons the right to request amendment of government-held records that are incorrect, requires agencies to publish information about their organisation and functions and the types of documents they hold, and requires these agencies to make available manuals and guidelines used in making internal decisions affecting the public.[31]

In the first seven months of its operation, until 30 June 1983, 5,669 requests were made under the Act, with two-thirds going to only four departments: Social Security, Taxation, Veterans' Affairs, and Immigration and Ethnic Affairs.[32]

In February 1984, a projected series of publications was introduced, to record significant developments in information management in the Australian Public Service (APS). Between 1979/80 and 1983/84, the growth in information processing in the APS has risen 130 per cent in actual dollars, and 50 per cent in real growth terms. Their Automatic Data Processing Strategic Plans indicate a particularly strong drive by the small-to-medium size departments to review their information needs and to relate these needs to the effective application of information technology, in particular the gradual consolidation and expansion of existing facilities which combine word and data processing through local area networks. It is intended that these networks will provide staff at all levels with direct access to management information forming part of the corporate database.[35]

In April 1984, the Department of Science and Technology issued a *Discussion draft of a national technology strategy*.[28] Listed amongst the national priorities in this document is the bridging of the gap between research and industry, through, amongst other initiatives. 'improved overseas and local science and technology information gathering and dissemination'. The *Draft* also notes that the largest area of employment growth in Australia is now in the information-related component of the services sector.

The Department of Science and Technology also commissioned a study by W. D. Scott & Company to develop a strategy for Australia to obtain the greatest possible economic benefit from the development of information technology. Their report, entitled *Information technology in Australia: capabilities and opportunities*,[59] recommended five major programmes, each comprising numerous initiatives.

The report noted that a prime responsibility for the generating of information rested with the IT industry itself, with roles also for individual companies, industry associations, professional institutions, and commercial information services. Principal requirements were identified as market data, industry data and technical data.

The Australian Libraries and Information Council (ALIC) was established in 1982 by the Commonwealth Government in co-operation with the State Governments to provide a forum to advance nationwide co-operation and co-ordination in the provision of library and related information services. Membership of ALIC includes the executive heads of the national and state libraries, three members nominated by the Commonwealth Minister for Education, and one nominated by the Commonwealth Minister for Science and Technology. In June 1983, ALIC prepared an *Issues and objectives* paper,[13] seeking comment from a variety of institutions and organisations, as well as individuals.

Amongst the sixteen issues raised in the paper are co-ordination of information in all forms as a national resource, complexity of the pattern of present library and information services, reciprocal access, public/private sector interaction, mechanisms for resource sharing, and staffing.

A number of individuals (*see* Lamberton[39]) and organisations, including ALIC, the Library Association of Australia (LAA) and the Australian Advisory Council on Bibliographic Services (AACOBS) have been urging the Government to consider the adoption of a National Information Policy. To this end national seminars were held in late 1981 and again in 1983. Although the government has recently set up an Interdepartmental Committee to deliberate the issue – with membership at present including the Director General of the National Library of Australia and the head of the information section of the Commonwealth Scientific and Industrial Research Organization (CSIRO) – as yet no definitive action has been taken.

Neither has action been taken on another proposal, for the establishment of an Australian Federal Libraries Council (AFLC). In 1977 the *Review of operations of Commonwealth departmental libraries* published by the Library Association of Australia (LAA) recommended creation of an independent planning and consultative body to co-ordinate, and thus increase the effectiveness and efficiency, of Australian government department libraries. The Public Service Board recommended against such a move in 1978.

In 1983 the Library Association of Australia again presented a submission to the Commonwealth government recommending that AFLC be set up to promote effective administration and better use of Commonwealth library resources by co-operative efforts and co-ordinated developments. Although the proposal was rejected by the Minister for Finance in May 1984, an LAA Committee has continued to work through the Secretary of the Department of Home Affairs and Environment to establish such a body under the auspices of the Public Service Board or within the Department of Home Affairs itself.

However, Bailey[16] notes that while such a body would improve Departmental libraries, a central co-ordinating agency with wider responsibilities for all information sources in the Australian Public Service would be required to provide a more truly integrated management information system for the APS.

Thus, although much has been written and recommended concerning the national need for more effective information management and greater commitment to information technology, these various reports have resulted in uneven development, with no cohesive overview. As Bailey describes the present situation: 'In most Federal agencies information is fragmented and dispersed and the staffs involved in handling the different information sources have no knowledge or experience of other information categories.' In summary, a unifying blueprint for integrated development of information services has been available since 1976 in the Coombs Report. Unfortunately, this approach has been ignored in favour of policies which considered various subsets of information resources, each in isolation from the others.

At the workface: *Snapshots*

To a large extent, national policies have had little effect on the services provided at the workface. The most successful information managers seem to use their expertise and skills, adapting to local needs and conditions. So I'll now turn my photographer's lens to a cross-section of information services.

Woodside Offshore Petroleum Pty Ltd: Perth, Western Australia

Woodside Petroleum Ltd is set to become one of Australia's major petroleum producers. Construction of the joint venture offshore platform facilities to supply natural gas from Australia's North West Continental Shelf is nearing completion, with gas sales having just begun. Nearly 1,000 persons were employed directly by Woodside during 1983, with several thousand more working on the North West Shelf construction.

Corporate information services for Woodside Offshore Petroleum are becoming as integrated and streamlined as the rest of the project.[60] Responsibilities of this section include:

1. Indexing, storage and retrieval of all materials prepared by and for the company, in keyboard, print and audiovisual format;
2. Co-ordinating and advising on storage and security of records in print, audiovisual and digital formats;
3. Distribution of correspondence and internal documentation;
4. Provision of library services;
5. Maintenance of a supply sourcing system.

At the end of 1983, there were twenty-four staff in the group, allocated to Correspondence Control, Document Service or Library work groups.

Correspondence Control handles around 7,400 items of correspondence a month, including approximately 2,800 telexes, 2,800 pieces of incoming mail, and 1,800 pieces of internal or outgoing mail. Computerised control was implemented early in 1983, following briefing of managers and training of secretaries and typists in all locations. Requests can be filled for known items, or by subject.

More than 150 requests for documents are received each month by the Document Control group. Interim enhancements were made to the document control computer system, enabling vendor equipment manuals to be indexed.

Requests to the Library average 180 per month, with an increasing number of queries involving searching on DIALOG, ORBIT, or AUSINET. The weekly current awareness bulletin, *IN PRINT*, results in an average of 120 requests per month, the majority for photocopies of journal articles. The library co-ordinates purchasing and lending of films, including videotapes of progress reports for home viewing. Indexing of photographic and audiovisual material began on a full-time basis in 1983, with 63,750 technical and public relations items (comprising videotapes, slides, negatives, films, viewgraphs, and proofsheets) to be added to the system.

The Supply Sourcing System contains data on nearly 10,000 companies and trade names. During 1983, approximately 550 contract and purchase order records, 5,050 product records and 1,350 catalogues were added to the system.

Activities underway in 1984 include the development of an archiving policy and corporate records retention schedule. Planning is well underway for the introduction of an integrated software package to handle indexing and retrieval of correspondence, company documents, library materials and photographs, as well as the control of journal subscriptions. CAIRS has been recommended for its suitability for both central and local records collections, ease of data conversion from existing in-house systems, common data entry and enquiry methods across all types of applications, and rapid Boolean searching even across large databases.[61]

Development of a methodology for total information resource planning is scheduled for the period August 1984 to December 1985. Staff from both the information services and computing areas, initially working with outside consultants, are expected to propose a corporate information plan which covers both computerised and non-computerised components of information systems.[51]

Other corporations which are making progress towards integrated information resource planning include Alcoa (also located in Western Australia) and BHP Petroleum (Melbourne).

The Parliamentary Library: Canberra, ACT

Over 150 staff provide reference, research and information services to Parliament, individual Senators and Members, and their staffs.[29, 30]

The Current Information Section maintains files on 3,000 subjects from Australian newspapers, periodicals, *Hansard*, and press releases. Over eighty hours of radio and television current affairs programs are recorded and transcribed weekly. A news digest, *Dateline*, which uses Australian Associated Press items from the teleprinter service, is provided four times each sitting day during session, and once or twice each non-sitting day.

The Reference Section provides manual and online services, including the use of SCALE (the Attorney-General's Department's Legal Database), ABN, AUSINET, I.P. Sharp, DIALOG, and ORBIT. A pilot project using STATUS software provides *Hansard*-on-line, with extended searching capabilities by subject as well as other descriptive fields.

In-depth, critical analyses, including policy implications and alternatives, are provided by the Legislative Research Service. Clients are ensured total confidentiality, and although they may use the information as they wish, views or opinions are not to be ascribed to the Service.

Info-Line: Sydney, New South Wales

The *Australian Financial Review's (AFR)* information service, Info-line, bills itself as providing fast response newspaper information and overseas research.[47, 34] A database of *AFR* reports since April 1982 and *Business Review Weekly* since 1981 are available online through AUSINET. Info-line is an Australian agent for the US National Technical Information Service, Her Majesty's Stationery Office, the World Bank, and many other overseas information banks holding more than 1.5 million regularly updated reports.

Info-line also runs a subscription service providing fast response, original research and question-answering services. Researchers have access to the most extensive media reference library in Australia, as well as using a number of international databases. Over 400 Australian organisations have joined the service.

Info-line at present seems to be the most successful of a group of commercial information firms, which have included Insearch-Dial, linked to the New South Wales Institute of Technology; Info-Quest, a branch of the Myers group, a major Australian retailer; and Triad, an independent consultancy firm. The growth – and in some cases, demise – of these firms is discussed in Killen[37] and Brodie.[20]

Australian Microcomputer Industry Clearinghouse: Melbourne, Victoria

The Australian Microcomputer Industry Clearinghouse (AMIC) is a co-operative venture between the Royal Melbourne Institute of Technology (RMIT), Technisearch Ltd (a subsidiary compay of RMIT, concentrating on research and consultancy for private industry and government, utilising staff of RMIT), and the Australian Computer Equipment Manufacturers Association.[4, 54] Sixteen international and local computer companies and peripheral suppliers are members, and have their equipment on permanent

display. The Department of Science and Technology is helping to sponsor Australian manufacturers.

The Clearinghouse offers microcomputer owners, operators and potential users a range of services, including access to hardware and software for personal evaluation in a self-learning mode or with demonstrator assistance. AMIC's neutrality is expected to appeal to individuals and business firms looking for advice without sales pressures.

The Clearinghouse is geared towards providing low-cost public access to computer time. At present, people can book time on any of the equipment at $6 per hour, or $3 per hour for students.

Other services include product evaluation, short courses, staff training, bureau service, consultancy and access to a database of Australian software and hardware, which is expected to be available as a nationwide dial-up service by the end of 1984.

The Australian Industry Development Corporation: Canberra, ACT

The Australian Industry Development Corporation (AIDC) is a statutory corporation set up by the Commonwealth of Australia in 1970 to facilitate and encourage the establishment, development and advancement of Australian industries, and to secure greater participation by Australians in their ownership and control. To this end, AIDC provides loans of $250,000 and upwards, as well as advising on financing arrangements. In particular, investment is centred on resources and energy development, manufacturing and construction, food processing, facilities for the transport of goods, and development and application of new technologies.[33, 10–12]

The information service provided for AIDC reflects the up-to-the-minute information requirements of its 160 staff, scattered amongst offices in almost every capital city in Australia. The information service is two people, two desks, and two phones. Gordon Bower, head of the service, describes himself as 'the only librarian I know who doesn't have a library'.

The primary objective of the AIDC information service is to meet the information needs of the Corporation's staff as efficiently and effectively as possible. The strategies used include the anticipation of user needs, utilisation of information sources irrespective of format, active participation in national and international networks, information delivery directly to the users rather than expecting the users to come to a service point, and involvement in the future development of the Corporation.

To these ends, the information service subscribes to approximately 200 journal titles, which are circulated on receipt. Multiple copies are a necessity, as the circulation list is limited to six or seven persons per copy. Major metropolitan daily and weekly papers are scanned by 10 o'clock for any reference to AIDC or its projects. ALERT and SCANfile, the current alerting services provided by the Parliamentary Library and the Commonwealth Scientific and Industrial Research Organisation, are used for SDI, but few retrospective indexes or abstracting journals are kept.

Commercial services are relied on heavily, including Info-line and Dun & Bradstreet's company reporting services. The Stock Exchange

Research Service is retained and used extensively, but located by the switchboard for accessibility. Retrospective and background queries are followed up using online databases, with document delivery using the national or local government department libraries, purchase or interlibrary lending.

AIDC does admit to collecting primary reference sources, as well as materials which build on existing strengths. These include company annual reports for about 1,500 companies, unique or unusual financial and business material not readily obtained elsewhere, and information about the AIDC itself.

Computerised Legal Information Retrieval System (CLIRS): Sydney, New South Wales and Melbourne, Victoria

CLIRS Australia Pty Ltd is a wholly owned Australian company established to provide a Computerised Legal Information Retrieval System (CLIRS), in accordance with agreements between Computer Power Group Pty Ltd, and the New South Wales and Victorian Governments.[26]

The core of the database will be the primary legislation and cases from New South Wales and Victoria. The Commonwealth Government has agreed to provide public access through CLIRS to Commonwealth legislation and related materials and to the decisions of the High Court, Federal Court and Administrative Appeals Tribunal. Direct access will also be available to a range of overseas databases from common law countries. The system will also provide access to other government information sources most frequently consulted by users, including court diary information, company records, land titles, probate indexes, and rulings of semi-government bodies and statutory authorities.

Electronic mail, electronic ordering of off-line prints, a wide range of directories, a bulletin-board service, and a newsfile providing brief digests of developments in the law and news of proposed legislation will complement the information retrieval facilities.

CLIRS textual information is made available using the STATUS software system. Communications access will be available for direct dial-up via the public switched telephone network or via AUSTPAC. The newsfile will also be accessible through videotex terminals. A pilot scheme was to commence in September 1984, and public access is scheduled for early 1985.

Information flow in small businesses: Perth, Western Australia

I have concentrated on some of the interested developments in information management. All is not viewed through rose-coloured camera lenses Down Under, however.

Maskell[46] of the Western Australian Institute of Technology undertook a study of information provision for small businesses in Western Australia. The results of his survey questionnaire showed that, although over 50 per cent of the firms responding had some collection of information sources,

fewer than 25 per cent had a person nominated to look after the collection. Only 5 of 178 businesses had a qualified librarian in charge of the collection. As sources for satisfying their information needs, companies used suppliers of equipment and material (57 per cent), their own collection (54 per cent), and the Confederation of W.A. Industry (39 per cent); government agencies, external libraries and the Chamber of Commerce less than 20 per cent. Maskell concludes that 'there is a definite need for information amongst the business community which is only partially being satisfied by their own resources and existing services'.

Despite the leaders in the field which I've described, Maskell's comment no doubt could be equally applicable to the majority of firms throughout Australia.

Recruitment and training for information management: *Into the developer and fixer*

Several attempts have been made recently to chart the growth in 'non-library' information management positions in Australia. One survey carried out from February to June 1983, monitoring advertisements in the *Canberra Times, Sydney Morning Herald* and the *Australian*, found a ratio of 5 vacancies for librarians for every 3 vacancies for persons not designated as librarians but requiring professional information-handling skills.[25]

Costello[27] has carried out a more detailed study for the LAA's Library Workforce Standing Committee, analysing advertisements from the Saturday editions of the *Sydney Morning Herald, Melbourne Age* and the *Australian* from May 1983 to May 1984. Of the professional positions advertised, she found approximately 40 per cent (267) were in libraries, approximately 10 per cent (65) in allied fields (archives, curator, records management, technical cataloguing and medical records), and 50 per cent (341) in the less clearly defined information area, including publishing and the book trade, research, information services and administration. Any positions requiring additional specialised qualifications (e.g. computing, education) were excluded from her tabulations.

Schauder[57] at the Royal Melbourne Institute of Technology has just undertaken a staff development project entitled 'Education for Information Management: A Study Based on a Survey of Information Professionals Employed in Victoria'. She has examined the Employment Section of the Saturday *Melbourne Age* over a two-year period to February 1984, and collected the details of those advertisements which used the terms 'information' or 'record(s)'; or had skills in the organisation and handling of information services on behalf of others mentioned in the duties or experience statement; or had a tertiary qualification in information science mentioned as desirable; and which were professional in the sense of being positions starting at a salary of more than $15,000 per annum and/or usually requiring experience and/or tertiary education. Advertisements for 'traditional' library-based positions were not collected.

A rough estimate of the average number of such advertisements were 7.5 per issue of the *Age* in 1982, and 10 per issue in 1983. Job titles included Information Manager, Information Co-ordinator, Information Services Officer, Data Dictionary Specialist, Administrative Officer, and Research Officer.

Broadbent[19] has outlined the duty statement for information managers in the Victorian Public Service as part of its Freedom of Information implementation program:

> 'Under direction to develop and advise on an information resources policy for the agency; to co-ordinate the application of systems and procedures for the management of the agency's information resources; to be responsible for the implementation of arrangements for access to the agency's records; to be responsible for liaison with co-ordinating agencies in the areas of information systems and methods, freedom of information and privacy matters, records management and disposal.'

Such information management positions have attracted librarians as well as managers, archivists and EDP specialists. Consideration is at present being given to restructuring the Librarian career grades within the Victorian Public Service to formalise these information management positions as alternatives to more senior librarian grades.

A similar wide range of backgrounds, including librarians, is common for clerks involved in the implementation of FOI in the Commonwealth Public Service. However, the trend in the Commonwealth Public Service is the reclassification of Librarian to Curator grades.

Broadbent has further noted[19] that several senior members of the library profession believe that the schools of library and information studies in Australia are leading the profession in responding to the needs of an information-based society, particularly in the use of computer resources.

My institution, Canberra College of Advanced Education (CCAE), was the first institution in Australia to offer a Graduate Diploma in Information and Records Management. This is an multi-disciplinary course, with requirements and options in the disciplines of library and information studies, computing, law, secretarial systems and communications, accounting, communication and media, and materials conservation. Interestingly, students who have enrolled in the course have done so almost exclusively on a part-time basis, and are employed full-time in a variety of areas: archives, medical records, computer systems, religious orders, botanical taxonomy, curatorial positions with manuscripts and maps.

Our undergraduate Bachelor of Arts in Library and Information Studies at CCAE, introduced this year, is a three-year programme which builds on a core of five information studies units. During their fourth semester, students select a specialisation for the remainder of the course: library systems and services, information retrieval, research and archival resources, or services to young people. A specialisation in information and records management is being planned. A capping core unit in Information

Systems Management is organised as a group project, in which the students apply their specialised knowledge to a real-life situation in one of Canberra's libraries or information agencies.

The Western Australian Institute of Technology is developing course content in the information science area. Both the Royal Melbourne Institute of Technology (RMIT) and the South Australian Institute of Technology have introduced information and records management required or optional units within their library and information studies programs. RMIT has also drawn up plans to offer a Master's Degree in Information Management.

Queensland Institute of Technology has postponed plans for an information management stream within the Bachelor of Business Administration degree, to consider instead introducing a full information management undergraduate degree in approximately four years' time.

Several other institutions have begun information oriented courses outside the existing library schools. These include a one-year Graduate Diploma in Communication and Information Studies at the Chisholm Institute of Technology; a Bachelor of Applied Science in Scientific Information Services at the Victoria College, Rusden Campus (both in greater Melbourne); a three-year Bachelor of Informatics at Griffith University in Brisbane, Queensland; a four-year Bachelor's degree course in Information Technology and Communication at the University of Wollongong in New South Wales; and a two-year Associate Diploma in Information Services at the Capricornia Institute of Advanced Education in Rockhampton, Queensland, which will be available by external studies.[52]

Aspects of information management have also been taken up at the continuing education level. The Education for Librarianship section of the Library Association of Australia, Victorian Group, organised a conference in late 1982 to look at the change in employment patterns amongst the library sector workforce;[44] a follow-up conference on the information professional will be held in Melbourne later this year.

A Unesco regional workshop held in Canberra at the end of 1983 looked at the techniques for promotion and marketing of information services.[45] LASIE, the Library Automation Systems Information Exchange, recently sponsored a two-day seminar on industry, innovative technology and information, bringing together managers, R&D personnel, information specialists, and government policy-makers, to increase their understanding of the complexity of the role of information innovation and to increase industry's awareness of the information services available.

A two-day invitational conference sponsored by AACOBS in early September was aimed at developing a research agenda for the library and information sector for the rest of the decade.

The professional association: *A holographic opportunity*

In 1979, the General Council of the Library Association of Australia set up a Futures Committee to propose objectives and policies for consideration

by the Association. After a slow start, the Committee organised a search seminar, held in Sydney in August last year.[43]

A survey undertaken by Brenda Gerrie for the seminar found that management, information-processing, and the provision of information service had superseded more traditional library tasks such as circulation, acquisition, and cataloguing. These findings reinforced those of the LAA's earlier personnel survey, which had indicated a shift towards user services away from technical services.

The Library Association of Australia has not moved as far along the path as Aslib in adopting an information management profile. The Futures Committee has made ten recommendations, which have been circulated to the Association's 6,000 members for comment.

In brief, these recommendations urge the LAA to broaden its objectives and take a variety of actions (including a change of name) to provide a professional association catering for the needs of the new range of professionals involved in the provision of library and information services of the future. Whether or not the profession can bridge the gap that as yet neither the government nor many private corporations have been able to, only time will tell.

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Non-use of library-information resources at the workplace

a comparative survey of users and non-users of onsite industrial-commercial services

Margaret Slater

Under-exploitation of any service provided by an employer is a serious waste of organisational resources. It is therefore important to explore the reasons why people do not take full advantage of library-information services at the workplace. To this end Margaret Slater has studied three occupational groups (all in the industrial-commercial sector): chemists, engineers, and insurance personnel.

The qualitative study described in this report is set within the wider context of the whole potential user population. It does not focus solely on the non-user in isolation but contrasts the information-seeking habits, problems, attitudes, beliefs, and motivations of users, deliberate non-users, and enforced non-users (i.e. those who lack any library-information facilities at work).

Slater has isolated certain factors predisposing to unsatisfactory levels of usage and her results will be extremely useful to information providers. Management too should be equally interested in participants' comments on the causes and nature of more wide-ranging problems at work (not necessarily information-related).

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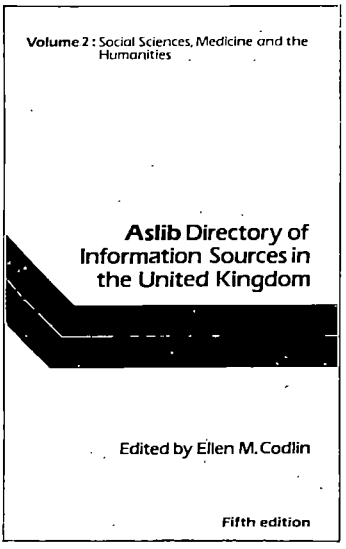


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Expanding information functions and horizons

M.J. Allen and S.E. Ward

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Information Services Department, Ware, Herts.

Paper presented at the 57th Aslib Annual Conference, 'Information Management: Potential and Practice', University of East Anglia, Norwich, England, 18–21 September 1984.

The dilemma facing the traditional information/library service

The rapid evolution in methods for information processing and sources of information supply is producing a climate of activity which makes it appropriate to consider the future of the traditional information/library department.

For the information/library department based in industry and commerce any debate on its future role will centre on two issues:

1. Will the future information/library department be simply a more efficient version of the present one, with its evolution dominated by external factors, e.g. changes in methods of information supply, and its involvement in information technology (IT) merely allowing it to provide traditional services more effectively?

or

2. Are these areas of company activity with which the information/library department is not currently concerned but with which it can usefully become involved, and which, taken with existing services, will give the information function a more strategic, fundamental and productive role in the management of information within its parent organisation?

The debate should be a real one. Yet, in our experience, few information/library departments or companies are actively engaged in really thinking about corporate information management and its implications for the information/library department. In Glaxo Group Research Ltd, we have begun to consider these issues and will use this paper to highlight the arguments for and against change.

Information services in the Glaxo Group of companies

The Pharmaceutical Industry is an information consuming and generating industry whose success is based on the efficient commercial exploitation

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of scientific excellence. The Glaxo Group of companies is currently particularly successful and, even more than most pharmaceutical companies[1], has increased its investment in traditional library and information services considerably during the last five years.

Table 1 shows the staffing position in Glaxo's formalised library and information departments (LIS) in 1979 and 1984 and indicates that the greatest increase has occurred in the information service supporting R&D.

TABLE 1: *Glaxo LIS 1980-1984*

	Scientific/Professional		Clerical	
	1979/80	1984/85	1979/80	1984/85
Intellectual Property	7	7	3	3
Medical/ Product Information	8	13	3	4
R & D	24	58	13	25
Manufacturing	1	3	7	2
Total UK employees	14,816	13,605		
Total GGR employees	1,556	1,752		

The Glaxo Group functions as a dispersed and decentralised organisation and in the UK, discrete operating companies have been established for specific company functions, many of which have their own information services. The parent company, Glaxo Holdings plc, undertakes the group's legal including patent activity, and the Intellectual Property Information Department undertakes all literature work required by the patents department. The selling of company products in the UK is achieved through three trading faces for ethical pharmaceuticals, each of which has a medical/product information unit under the management of a medical advisor or marketing director. These teams answer enquiries on company products from the medical and health care professionals directly and via the selling forces. Glaxo Group Research Ltd discovers and develops new drug entities – its Information Services department both provides information support to R&D staff and also co-ordinates handling of published literature services on company products to trading faces throughout the world, as well as providing library and information services to the staff of several other companies on the Ware and Greenford sites where the research company is located. Primary and secondary manufacturing sites are spread throughout the UK but on most sites have little beyond basic library support. Links between these groups are generally informal. The library services of Glaxo Group Research Ltd

provide limited back-up facilities to libraries on other sites and the intellectual property group provide patents searching facilities on behalf of all other library and information departments. More formally, the R&D information department is specifically responsible for providing a database of company product literature to Glaxo companies in the UK and overseas.

The R & D information service of Glaxo Group Research Ltd

Investment in formalised information/library services is high and the growth in recent years has occurred in the services relating to the scientific nature of the company's business, summarised in Table 2 – the use of information services to support drug discovery, development, marketing and selling.

TABLE 2. *Significant stages in development of a marketed drug*



There has also been within Glaxo Group Research Ltd a major increase in the size of other professional groups for whom information handling is a major part of their role – Regulatory Affairs, Drug Surveillance, Clinical Data Monitoring, and Development Planning as shown in Table 3.

Interestingly many of these groups recognise the value of information scientists and include information scientists within their staff complement. In Glaxo Group Research then almost half the staff expansion since 1980 has been in information handling functions. Within these the growth of the R&D information department can still be seen as being comparatively high.

TABLE 3: *Growth in information services supporting pharmaceutical R&D in Glaxo Group Research*

	1979/80	1984/85
R&D Information Services	38	83
Regulatory Affairs	25	37
Drug Surveillance	2	11
Clinical Data Monitoring	20	38
Development Planning	21	21

Increase in size is, of course, not necessarily synonymous with success. Nevertheless the growth of the Glaxo Group Research information service must demonstrate that its services are perceived to be of value, that it is efficient in operation and that it is effective in identifying new areas of activity which are seen to be highly relevant to the company's objective, that of rapid discovery and development of safe, novel, and profitable medicines. The Glaxo Group Research Ltd's Information Services department provides all the functions normally seen in a pharmaceutical information department[2]. In fact the department is committed both to the effective use of published information within the organisation (Table 4) and also to developing efficient central services for the storage, retrieval and communication of internal data and documents (Table 5). Considerable development of internal information services is occurring and is based on an extensive computerisation programme to provide immediate access to chemical and biological data to research scientists. The company's database of internal reports is also being made directly available to senior staff. An extensive library computerisation programme including an online catalogue is streamlining the movement of requests of all types from end-user to supplier and a variety of 'value-added' current awareness and retrospective searching services utilise all relevant external online and manual sources. The department has an active information technology programme which has achieved considerable streamlining of administration procedures utilising word processing and which is looking at the further exploitation of information technology for streamlining literature processing. The department is also beginning to consider how to introduce its end-users to the techniques of online literature searching.

A particular success for the department has been the development of a database of published bibliographic references on company products. Based on a Prime computer on the Greenford site, this database is available via PSS to Glaxo's overseas medical and marketing groups in addition to its use by department staff for enquiries and production of product bulletins, and product bibliographies (Table 6).

In both its internal and published information functions the department integrates well with the company's activities and objectives and with other information processing functions. Every effort is made to meet new staff at all levels in the company and to make continued contact with groups and senior managers.

TABLE 4. *Published information services of the Glaxo Group Research Information Services Department*

Idea Fundamental Research Select biological target Research project Development candidate Clinical trials Product registration Product Post-marketing support and surveillance	↑ Library SDI In-house bulletins Retrospective searching ↓	Product information system and services ↓

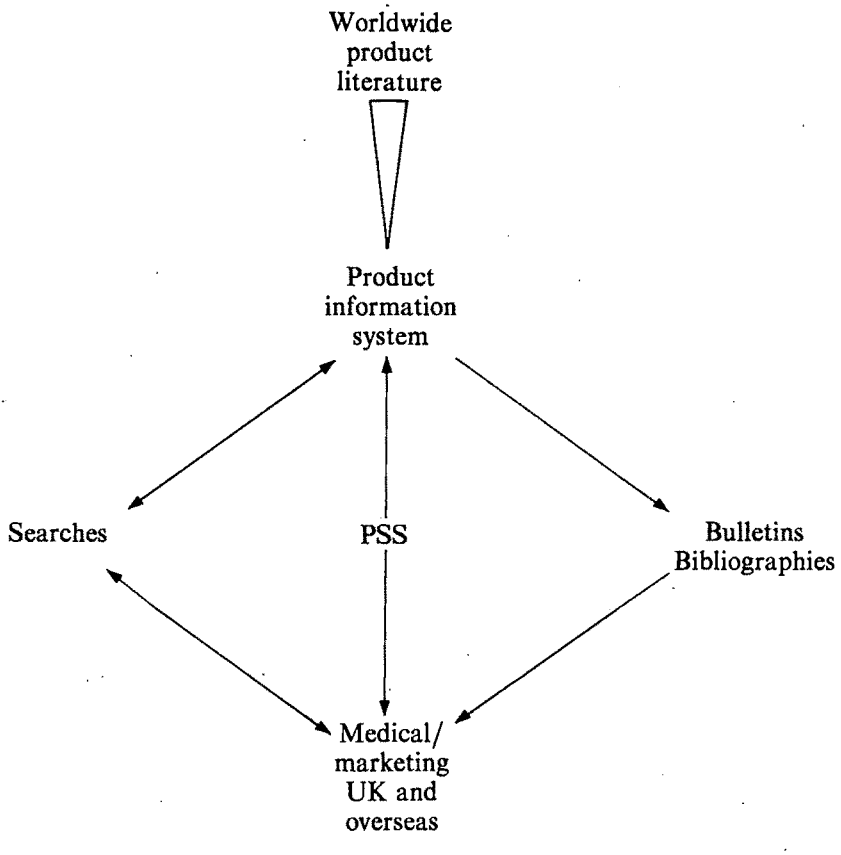
TABLE 5. *Handling of company information by Glaxo Group Research Information Services Department*

Fundamental research		Archives Microform ↓	Reporting policy and central files ↓
Research project	Secretarial services	Integrated research databank ↓	Screening Co-ordination
Development candidate		↓	
Clinical trials			
Product registration			
Product launch			
Post-marketing support & surveillance		↓	↓

Primary factors responsible for the growth of existing services and contributing to potential R & D information service opportunities

The department has very obviously responded to company needs in developing its current range of services and it is important to identify some specific factors which have influenced its growth. These can be classified under the headings of legislation, commercial influences and policy decisions (see Table 7).

TABLE 6. *The Glaxo Group Research product information system*



Legislation has prompted us to initiate services in two areas: archives and health and safety information.

Securing authorisation to market a drug requires the painstaking collation of laboratory data and supporting reports which demonstrate unequivocally the safety and efficacy of the drug to regulatory authorities throughout the world. In addition to the enormous quantity of documentation presented to them, the F&DA and the OECD require raw laboratory data and specimens and all documentation connected with studies to be archived and available for inspection for a considerable time after registration. Collection, storage and indexing of this material requires staff, space, and a considerable investment in microform to ensure security.

In response to the Health and Safety legislation, the department has developed specific expertise in published hazards which may be encountered by the laboratory worker and in matters of general safety which affect manufacturing, transportation and other key company functions.

TABLE 7. *Influences on the development of the R&D information services*

Legislation induced services:
Archives – raw data, tissues, slides, documents
Microform
Health and safety – current awareness and search services

Commercial influences have stimulated:
Creativity
Development of market support services

Policy decisions have directed
Secondment of information gathering
Collation and storage of research data

Personnel
Recruitment of scientifically-qualified staff

Current awareness bulletins are circulated throughout the UK, the safety specialist is closely involved in safety committees, and considerable effort is devoted to in depth evaluation of the hazards literature.

Commercial influences can be viewed from two angles. Firstly, the company's commercial success has stimulated continued expansion of its R&D investment seen as essential to its continued growth. This, in turn, has allowed the R&D information department to expand and to invest in new services. An environment has therefore been provided in which the information scientist can be creative, looking at new methodology and also new areas of work, leading to increased productivity and increased value of the service.

Secondly, Glaxo, in common with most other pharmaceutical companies[3], recognises the importance of the published literature on its products in marketing and selling. Continued review of the published evidence on the efficacy of the product provides material for marketing strategy. The complex action of drugs means that their use must be supported by an enquiry service which has all current information at its fingertips. The enormous investment in acquiring and disseminating company product information worldwide is therefore regarded as essential. Increases in sales and an increased awareness of the importance of information by the health care professionals place an increasing demand on this service. The demonstration of product information services at conferences is clear evidence of their commercial importance. The opportunities provided by information technology are stimulating involvement of the department in developing novel techniques for delivering information on products to the medical and allied professions.

Policy: although Glaxo Group Research has no formalised information policy, an important factor in Glaxo's R&D management policy has been

the decision that scientist's time should be freed for creative work. This, coupled with the recognition that published information is essential for creativity, has provided the basis for investment in evaluated current awareness services and in qualified staff and all facilities required for retrospective searching to support research projects. Information scientists are members of most research projects and are trained both in scientific developments and in information techniques. The department has also developed as a consequence of company policy a key role in developing documentation standards and in co-ordinating the documentation of research data and its communication. The information department devotes considerable resources to primary research, producing systems which give access to structures, compound samples, and biological and physico-chemical data. This type of service is commonly seen in pharmaceutical companies.

Personnel: The Pharmaceutical information/library department has always recruited graduate staff with graduate or post-graduate qualifications in scientific disciplines directly relevant to the company's research interests. Laboratory experience has been regarded as an asset. Staff have therefore been able to establish scientific credibility and the resultant trust in the services has stimulated further demand. Also, their previous experience has provided information staff with an excellent base from which to develop the real understanding of company need necessary to support the development of new services.

At the present time the Information Services department can be seen to be involved in a wide range of services essential to the efficient operation of Glaxo Group Research Ltd and other Glaxo companies (Table 8) and in seeking to streamline and build on these is excellently placed for continued success.

However, no service department can afford to be complacent about its future, particularly when technological developments are likely to enable its customers to become more self-sufficient in retrieval of published information and storage of personal data. It is therefore important that the pharmaceutical R&D information department critically appraise its success and takes a realistic view of its present company role.

Critical appraisal of present 'success'

Table 2 showed the key stages in the drug development process. Let us now identify those stages where the increase in information staffing has been significant or where services have been initiated where previously there was no information service involvement. The increase in R&D information staff has made some impact, most notably in:

- supporting decision-making within the research projects
- documentation support to the legislative requirements of regulatory submissions
- management of published information on company products.

TABLE 8. *Current investment in information services, Glaxo Group Research Ltd*

	Professional/ Scientific	Clerical
Management	4	2
Library	4	8
Translations	2	
Non-scientific	1	
Reference work		
Archives	3	
Microfilming		3
Primary research data	14	3
Reports	2	
Health and safety	1.5	
Research literature	12	3
Registration	1	
Product literature	8	3
Secretarial support	2	3
Information technology	2.5	

At the same time there has been a concentrated effort in streamlining and automating the traditional services of current awareness, retrospective literature searching and the handling/archiving of internally produced information. All these have been based on the traditional skills of acquiring and reviewing information, of indexing and of designing information processing systems.

However, in the scheme depicted in Table 2, support is patchy, increase in staff has been partly to compensate for meeting the needs of additional scientific staff, partly to handle diversification of research and partly to ensure a common standard of service across all user groups. It should be noted that as the information department staffing has increased, so also has the personal/departmental information activity of end users, and other departments concentrating on internal information handling have expanded (Table 3).

Apart from the successes described earlier, a critical look at the department's involvement in the stages of drug progression reveals that despite a substantial and justified increase in staff numbers the department's present role falls far short of the ideal. Summarised in Table 9, the following shortcomings can be identified:

(1) The department still primarily supports *only* the first and final stages of the drug development pathway – the research project and the marketed drug. Support to staff in these stages is taken for granted, and the contribution this makes in later stages of drug development does not produce kudos or status for the department.
(2) Only limited support is provided to key managers and the important decision-making processes.

(3) The department has not reached the situation where its resources/skills are automatically utilised or considered when important R&D/marketing decisions are made – other information handling departments are much more closely involved.
(4) The R&D information service is not commonly used by staff as a springboard for promotion within the company. Again, other departments, e.g. Regulatory Affairs, Development Planning, are more favourably viewed.
(5) The R&D information service has seen the growth and emergence of other departments whose main tasks centre around information processing – e.g. Regulatory Affairs.
(6) A corporate information policy has not yet been developed.
(7) The R&D information service has no defined responsibility for 'driving' the introduction of new technology for information handling or for streamlining information processing throughout R&D beyond primary research.

TABLE 9. *Present limitation of R&D information service*

– Partial involvement in R&D Process
– Limited support to key managers and important decision-making processes
– Skills not automatically considered
– Does not provide a promotional springboard
– Other information departments have emerged
– Lack of corporate information policy
– No defined IT role

So whilst the surface picture is one of a healthy, thriving department, a more critical analysis raises concerns which throw into question whether the department's evolution is really on the right track. This analysis of the present situation within Glaxo Group Research Ltd is reflected in the industry at large[5].

Let us now examine some of the reasons why the information profession within the pharmaceutical industry is in a critical position, the problems for the profession if there is no positive change and some of the efforts being made within Glaxo Group Research Ltd to remedy the situation.

Reasons for lack of real corporate role for the Industrial Information/Library Department

In general terms, information managers must take a large proportion of the blame[6]. The evidence for this can be seen in a number of indicators:

– Many professionals lack ambition to succeed at the highest level.
– Most staff are unwilling or unable even to begin to think of their work in non-traditional service terms.

- A willingness to leave it to others – e.g. DP departments, to take up the challenge of effective information handling at a personal/department/corporate level.
- Inability to understand fully and face the challenge that technology is forcing in information-handling at all levels within the company, and the potential benefits to the department of taking up the gauntlet of such a challenge.
- Very few information departments have formulated policies and objectives designed to incorporate the IT factor, i.e. departments are unwilling or hesitant to involve themselves in the exploitation of IT outside their own functions.
- Inertia or lack of belief in themselves.
- Lack of resources. Many departments have been pruned in recent years; however, important departments will suffer less cutbacks during recession.
- Failure to accept that *change* must be the order of the day if the information department is to survive.

What are the problems if the situation is allowed to continue?

Most pharmaceutical information departments are still relatively healthy[1]. Providing the industry remains profitable, many of them can continue in their present form for several years. However, it is our view that unless approaches to the management and development of the information service change, stagnation will become evident. This stagnation will be demonstrated through the following indicators, already seen outside the pharmaceutical industry:

(1) Lowering of status – information support, especially in the traditional published information role, will be seen as a 'low level' exercise. Whilst the information department will not disappear, its importance will continually diminish.
(2) Inability to recruit staff of the necessary calibre – not seen as a profession to enter. This factor and the one above form a vicious circle.
(3) Non-information individuals will be called upon to formulate and implement information policy.
(4) Cost-cutting exercises will begin and continue.
(5) The information department will be left with the boring jobs others do not wish to do.
(6) The involvement of end-users in personal information-handling will be the death knell, rather than the challenge and partial saviour of the traditional role.

Approach adopted by Glaxo Group Research Information Department to ensure continued and successful growth

Have we within Glaxo Group Research successfully tackled the issues

raised in the preceding sections. The answer is party *yes* and partly *no*. What the information department has done is summarised in Table 10.

TABLE 10. *GGR approach to future development of information and library service*

Recognise danger
Question traditional roles
– Plan for 'new' departments
– Push for involvement in strategic areas
Be prepared to switch resources
– Recognise fundamental important of IT
Be bold and imaginative

Most importantly, we have recognised the danger of ignoring the problems and the potential benefits to be gained by rising to the challenge. Realising that a passive role is likely to be disastrous has led us to initiate the following activities:

(1) We have started to question our traditional roles and begun to examine the 'life' left in them.
(2) We have begun to plan for a *future* department whose objectives and role will be very different than the one perceived today.
(3) Department managers have started to *strive* for involvement in areas which we consider of strategic importance to the company and which are often not normally handled by the information department.
(4) We have been prepared to *switch* resources to reflect changing priorities at the *expense* of traditional service provision.
(5) We have recognised the absolute necessity of being involved in the application of IT not only for departmental activities but also with company wide responsibilities.

What has *not* yet been achieved is:

– A full analysis and understanding of where information skills can be most advantageously used in company terms.
– Successful strategies for creating a role with recognised responsibilities for ensuring the company handles information at a local and departmental level in the most effective way. (An essential component of a future strategy and a corporate information policy.)
– Sufficient credibility throughout the company at large (both within R&D and other Glaxo companies) to feel confident that the resources and skills of the department are always put to the most productive use.

These objectives can be realised with the energy and commitment of the departments managers and staff. To ensure success there are a number of activities which must be initiated and are beginning to be initiated. These are summarised in Table 11.

TABLE 11. *Glaxo Group Research Ltd: Information Services Department – realignment*

Staff – plan, prepare and train
Equipment
External contacts
Budgets
Case presentation/image-building

Staff

The department must recruit staff to be involved full-time in information technology activities, and begin to build up an active information research team around such staff. All department staff must be trained in the use of modern IT equipment – e.g. word processors – and must understand thoroughly the opportunities provided by such equipment for information handling. In particular, existing staff must be encouraged and persuaded to recognise that the future role will be significantly different from their present one.

Equipment

If staff are to carry out their role they must have access to the necessary hardware and software and budgets must aim to achieve substantial penetration of work stations. Glaxo Group Research Ltd has a particularly enlightened view and has already equipped an extremely high proportion of staff with work stations which can access its prime computers and PSS via the Prime's netlink facility. The department is thus well placed in its level of equipment and has a variety of devices: terminals, printers, graphics work stations, word processing workstations, microcomputers.

The above is under consistent review and by the end of 1985 a ratio of 1 work station: 2 staff will be achieved.

External contacts

The complexity and pressure of current information work is such that the department has recognised that it will not always have the appropriate expertise on tap. A deliberate policy of strengthening external contacts with universities and consultants is being followed in order to most effectively exploit information expertise outside GGR. In addition some work particularly on backlog processing is being seconded to external agencies and this policy will extend to routine work where appropriate.

Budgets

Whilst all budgeting must be carefully justified there is nothing to be gained by being narrow-minded and refusing to take a long term view for fear of upsetting one's management. The information department should

argue for resources with new responsibilities in mind and fight strenuously for finance and time to initiate new development of demonstrable benefit. Budgets must relate to company profitability but there is no reason why the information department should be at the bottom of the heap.

Case presentation/image-building/department development

It is important that staff constantly seek out opportunities to give presentations on department services and skills, to be involved with projects having a bearing on senior management decisions, and actively solicit relationships with other information or IT inter-departmental groups within the organisation. Contacts will ensure that the department understands the company's objectives and therefore how these can be supported by information services.

Current work areas where we see new roles emerging include those shown in Table 12.

TABLE 12. *New strategic areas for information services department*

Office automation
Microcomputers for personal information handling
Senior management services
Value-added traditional services

These, coupled with the traditional activities shown in Tables 4 and 5, will allow the department to ensure that the processing of internal information is efficient at the personal, departmental and company levels. In addition, information staff can continue the development of interpretative literature services which are based on understanding of the information required for effective work by all levels of company staff.

Of these functions, office automation is particularly important. All groups within Glaxo Group Research Ltd carry out some office functions and effective information handling is central to these. For the company to achieve efficient production, communication, and retrieval of full text, then the expertise of the information department in analysing information flows and retrieval requirements and progressing information systems development is crucial. Likewise support for the microcomputer user in developing personal information systems can and must be given.

Conclusions

Whilst the Glaxo Group Research Ltd Information Services department has been more successful than many similar departments in fighting off staff and budget cutbacks, a critical appraisal of current successes show them to be patchy and insufficient to allow the department to claim a real information management role. The route to developing the department's activities to include more strategically useful functions must be the

formulation and implementation of **bold information management** policies. The future can be bright if the challenge is taken up and will allow traditional and future roles to merge successfully. We have outlined some of the methods being adopted by the department in strengthening our future base. Whether we are on the right track . . .

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Costing and the economics of library and information services

Edited by STEPHEN A. ROBERTS

In the light of dwindling resources and increasing user needs, today's library and information service managers need more help than ever in making informed and effective decisions about economic planning and budgeting; an understanding of costing concepts and techniques is essential for those managers who wish to ensure the efficiency and productivity of their services. This volume aims to provide the hard-pressed manager with a balanced selection of readings on the costing of library and information services.

The book is divided into the following sections:

1. Library and information service costs: context and concepts
2. Investigating and measuring the system
3. Basic approaches to service costing
4. Practice and practical studies
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Distributed information processing: trends and implications

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BP International Ltd

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Definitions and scope

Ask what is meant by 'Distributed Information Processing' (DIP) and you are likely to receive as many varied answers as there are respondents. Depending on their background and experience, they may refer to such matters as distributed computing, communications networks, clustered mini-computers, office automation, local area networks, personal computers; the list is virtually endless.

Some sample definitions from the literature include the following:

> 'Distributed processing is the processing of data at different physical locations in a computer system in which several interconnected computers share the computing tasks assigned to the system'[1]
>
> 'Distributed processing technology is one in which intelligent machines in different locations co-operate' by means of networks'[2]
>
> 'Distributed processing is loosely defined as the use of a multiplicity of computational devices for a single processing task. [It] implies that the units that compose the distributed computer can freely intercommunicate. If the distribution is other than local, then remote computer communication facilities are required'[3]

These definitions emphasise the networking and connectability of computers. This highlights the difference between distributed and decentralised processing where the latter can provide local computing facilities to users but does not satisfy a need for inter-communication.

For the purposes of this paper the boundaries of the definition will be drawn somewhat wider to be more in line with the three-level approach outlined by Thierauf.[4] Here the first-level system centres on local processing independent of any other computing facilities, the second combines local processing with terminal-type access for data entry, transactional

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processing and preparation of, for example, management reports, while the third level provides a network of distributed processing systems to meet user needs both at local and remote locations.

Thus the essential emphasis of this technology is (or should be) to place computing power in the hands of those who can make the best use of it both for themselves in their day-to-day work, and for the organisation as a whole via communication networks.

The definitions considered so far emphasise technology, and many of those to whom this paper is addressed believe that undue emphasis is placed on this aspect, to the detriment of the information which that technology handles.

Here information is considered chiefly in terms of informational data (facts and figures), diagrams and pictures and text, or varying combinations of these as met by users in their work. On the broadest front, information, i.e. data which have meaning and relevance to the user, may be received by the user through any of his or her senses. For an information-seeker, sound, touch, taste or smell may at certain times be as or more important than data gathered by sight.

Having defined the terminology, consideration will now be given to information activities and related technology, hardware and software issues, technology convergence and compatibility, and finally the implications for management of such developments and trends.

The subject of the paper is broad in scope and inevitably readers may detect gaps in coverage or will hold different views to those presented. The opinions expressed are the author's and furthermore do not necessarily represent those of BP.

Tools and information activities

The new technological tools are exerting a greater influence in shaping organisations than did the activities themselves which the tools now perform. In order to appreciate the magnitude of this influence one needs to consider the tools which have been, and are becoming, available to cover the full spectrum from information creation through to storage and even disposal.

Information is essentially immortal in that unlike other organisational assets, it expands, develops and appreciates with use and never really dies. Nevertheless the life-cycle view is adopted here for expedience and may be taken to comprise the following activities:

originate,
preserve (including store),
retrieve,
manipulate,
synthesise,
communicate,
destroy.

Mostly the meanings of these terms are self-evident. Nevertheless the distinction between manipulation and synthesis deserves some clarification. The former relates to information-processing usually on a regular basis acccording to formal rules or standard procedures. Little intellectual effort is applied between the input and output stages of the process once the system has been established. However, the system itself, such as one for computer-based accounting, may have had extensive specialist knowledge and expertise applied to its specification, design and implementation. Synthesis, on the other hand, involves the building-up or putting-together of information involving combinations of separate elements of thought into a whole, often on an ad hoc, informal basis. Considerable intellectual effort is applied between the information input and final output stages.

Examples of both conventional and new technological tools applied to these activities appear in Figure 1.

FIGURE 1. *Information Activities and Technology.*

Information activities	**Conventional technology**	**New technology**
ORIGINATE	Writing/shorthand Typing Dictionaries Carbon copies Typesetting	Word processing Spelling checkers Character recognition Voice recognition
PRESERVE	Paper Microfilm Filing Cabinets Handbooks	Magnetic storage Video Electronic filing Databases
RETRIEVE	Card Index Edge/body punched cards Abstracts index	DBMS IR Office automation Hardware solutions
MANIPULATE/ SYNTHESISE	Centralised DP Calculator Manual graphing Diary	Distributed/decentralised 'What if' software Electronic diary/scheduler AI/Expert systems Fifth generation
COMMUNICATE	Post Telephone Telex Personal	Electronic mail/ Document distribution Computer conferencing FAX Viewdata
DESTROY	Shred Burn Medium destroyed	Magnetic erasure Optical erasure Reusable media

It is perhaps too easy to overplay the influence of current new technology on the creation and recording of information. Arguably the introduction of the conventional manual typewriter created greater organisational upheaval than the present word processor. An early advertisement for a Remington stated: 'It is the size of a sewing-machine, and is an ornament to an office, study or sitting-room. It is worked with keys, similar to a piano, and writes from thirty to sixty words per minute – more than twice as fast as the pen – in plain type, just like print.'[5] Despite the wide choice and ready availability of WP equipment and the relative maturity of the product, it seems that only now is the cost of handling text information on micro systems considered to be lower than that achieved using conventional typewriters.[6] Nevertheless, still further increased expenditure on word processors was envisaged by office automation managers in a recent survey.[7]

Aside from the traditional keyboard, other methods of inputting, and creating information are coming increasingly to the fore. These include character-recognition systems (OCR etc), the latest of which learn to recognise new character fonts, digitising equipment for recording documents as images (e.g. the IBM Scanmaster), voice-recognition systems such as VOTAN and, for output, demand-printing facilities linked to such units as laser printers, e.g. XEROX 9700.

Voice-recognition (and output) is considered by some to be the ultimate user-friendly interface.[9] Already systems are to be found in operational or developmental use, for example by remote sales staff, and for providing access to information retrieval and video-based systems.

Once means have been provided to assist with the creation of information, it has to be stored in some form using a suitable medium. Floppy disks, hard disks, video film, video discs, photographic film, and microfilm are just some of the storage media in use. Companies who have traditionally operated in one field are seeing their markets threatened and are moving into other technology for defensive or offensive reasons. Publishers, for example, are embracing videotext and videodisc technology in moves away from paper-based products (see, for example, Cook[10]). Optical discs also offer the potential for high density storage of OCR archives.

Stored information is of little use unless it can be found as and when required. The advent of computers together with suitable retrieval software has offered markedly increased opportunities for improving the effectiveness and efficiency of the retrieval process. Two main avenues of development have emerged over the years. Firstly there have been the database management systems (DBMS) dealing with structured data where standard queries are posed and exact matches on the information sought are necessary.[11] Often a considerable degree of manipulation of the data occurs. Secondly there is information retrieval, usually from text-oriented databases, which involves the use of natural rather than artificial language and does not rely on an exact match to achieve useful results via powerful indexing facilities.[12]

For certain applications, such as in the commercial and marketing area,

there is often a need for a combination of both approaches. Thus both ad hoc and standard searches may be required. In addition input and searching may benefit from powerful and flexible thesaurus and indexing facilities. If online immediate update is required then much of the available IR software is unsuitable since considerable processing is necessary to create the various indexes. In these instances a DBMS may be more appropriate either on its own or operated in conjunction with the IR system. The choice made will depend on the relative importance of these and other factors.[13]

The debate continues as to the relative merits of network, hierarchical and relational databases in the traditional data processing environment. It is felt by some that relational systems will have their main impact in the micro and networked micro field where no preexisting investment in other database software exists.[14]

Hardware-oriented solutions, as instanced by associative storage (content-addressable file) systems or the dedicated database machine are also being promulgated. For the foreseeable future, however, minicomputers plus appropriate retrieval software are likely to provide the most suitable means of satisfying corporate needs for database storage and access.[15]

For micros many products are available[16] which appear under the database banner. All have their good and bad points and potential users are well advised, before committing themselves, to test the software to their satisfaction.[17]

Finally, one should not ignore the string search facilities in word processing and office systems which may well satisfy retrieval requirements for relatively small amounts of information.

Communicating with computer-based information stores usually requires some substantive experience and knowledge both of the query method and of the information content and organisation if effective and efficient retrieval is to be achieved. Developments in this area include natural language enquiry and the use of the micro plus online search software which may be tailored to specific databases or database spinners (see, for example, references 18, 19).

The manipulation and synthesis of information in a computing environment includes, for example, graphics,[20] statistics and report-generating software, simulation packages,[21] integrated packages containing word processing, graphics and database, and the emerging area of artificial intelligence (AI). A growing number of AI/expert/knowledge building systems is available[22, 23] and the library and information fraternity is but one of many considering their applicability to their areas of responsibility.[24, 25] The so-called fifth generation computers promise a synergistic integration of these systems with developments in such areas as integrated circuits, supercomputers and microsystems.[26]

Distribution of this burgeoning amount of information held on new technology demands that suitable communication media be available so that such facilities as document distribution, electronic mail, computer conferencing, and remote enquiry and processing can be effected. The

EEC DOCDEL programme,[27] for example, is aimed at simulating the development of electronic publishing and delivery systems.

The last information activity noted is disposal. The benefit new technology brings here is that the media involved are mostly reusable. This should reduce the need, for example, for paper-based products. One potential danger, however, is that information in electronic form is too easily destroyed and measures need to be taken to ensure that adequate back-up procedures are operated so that erased information can be readily and rapidly restored.

Before proceeding to the networking and convergence of these activities, brief consideration is given to general hardware and software aspects.

Hardware and software

Mainframe suppliers (e.g. IBM) move into microcomputer production, minicomputer manufacturers (e.g. DEC) move to clustering of processors[28] and 32-bit micros emerge from new concerns (e.g. Fortune Systems) to challenge the mini – if companies are to survive they have to consider carefully their commercial stance and decide how to defend established positions, move into totally new markets away from existing products, or attempt to increase their general coverage of the total market. A balance also has to be struck between recovering costs of investment in current products being marketed, and the funding of R&D for new developments some of which will eventually displace those in production. Cash-flow problems have caused several companies to fail.

Computers, certainly at the lower end of the market, seem to have already become part of the throw-away society. Perhaps a misspelling in a recent advertisement for a minicomputer indicates the way this tendency will progress up the market. The product was praised for its total 'expendability' rather than its 'expandability'.

The battle lines are therefore drawn on several fronts and there are bound to be casualties along the way. Is IBM's mainframe strategy sound?[29] Will Sinclair succeed with wafer scale integration?[30] Can the terminal survive the onslaught from the PC?[31] Will the emergence of the deregulated AT&T as a 32-bit chip and computer supplier shake the market?[32]

While hardware and software companies strive to dictate the next advance, the users demand some stability so as to avoid the pitfalls of obsolescence and incompatibility. Microcomputer manufacturers, particularly of the new variety, come and go and a constant watch needs to be kept on the market[33, 34] to help decide who will be the stayers.

It is to be hoped that intending computer users are becoming more aware that hardware is only half of the equation. Fortunately software directed at satisfying relevant organisational needs is becoming more widely available (see, for example, references 35, 36) but the majority of it is still only suitable for use by those who are computer literature.[36] There is no single solution to this problem since the background, experience

and knowledge of users differ as do their computing needs. Hence a wide range of approaches are being pursued which are aimed at improving the interface between user and computer.

These include natural-language querying, voice control, windowing software, the use of icons for task selection, and the mouse attachment. End-user experience of these is still limited and there are those who doubt the long-term benefit of so-called user-friendly menu systems or integrated operating system/software approaches. Once familiar with the system, users may want to bypass the 'handholding' approach and proceed direct to their application. For infrequent, casual users the opposite may be true. In the end, to be successful the commercial software supplier or programmer must provide what the customer needs rather than what he or she wants.

Compatibility, completeness and continuity

The conventional information-handling tools instanced in Figure 1 are generally based on different technology or physical make-up and hence are not amenable to integration without human intervention. For example, a letter will not reach its intended destination unless it is placed in an envelope, sealed, stamped, posted, collected, sorted, transported physically, sorted again, and delivered. Compare this considerable manual and intellectual effort with the minimal tasks associated with electronic mailing of the same message.

The new technology is based essentially on digital electronics which facilitates integration and has presented the opportunity for computing, telecommunications and office systems such as word processors to coalesce.

The corporate implications of this can be highlighted by considering the predominant information activities of some organisational units in relation to the type of information they handle and whether or not its origins are internal or external to that organisation (Figure 2). Thus centralised data processing units have traditionally been concerned with regular, formal

FIGURE 2. *Main information activities performed by some organisational units.*

	Internal	External
DATA	DP Units (P, M, C, D) R and D team (O, S, C) Production Unit (M, C)	Information Units (R, S, C) Market Research (R, S, C) Telephone switchboard (M, R, C)
TEXT	Registries (P, R, M, D) Personnel (O, M, C) Typing pool (O, M)	Libraries (P, M, C) Legal Dept. (P, S, C) Postal service (M, C)

Key: O – Originate, M – Manipulate, D – Dispose; P – Preserve, S – Synthesise; R – Retrieve, C – Communicate



manipulation of data emanating from other parts of the company. Research and Development teams, however, originate information and apply considerable intellectual effort to synthesising it. Typing pools create documents using standard procedures while telephone switchboard operators have an additional retrieval activity when answering enquiries.

The point of the examples presented in Figure 2 is that certain activities will be common to different areas. This fact coupled with any information flows between these various units means that the associated new technology may be capable of integration across the organisation to the latter's benefit. For example:

- Research reports produced on word processors for the R&D team are transferred electronically to the information unit for entry in a remotely-accessible database.
- Documents and files emanating from office automation systems are copied to a records management and control database to provide corporate-wide access to company records.
- Information is extracted from external databases (subject to copyright agreements) for local processing and integration with internal sources.
- A telecommunications network provides the necessary communication links across the company and to outside public carriers.
- Operational and commercial information is extracted from centralised computer-based files and specialised corporate units into a management information or decision support system accessed interactively and manipulatively by senior staff.

The significant phrase above is 'may be capable of integration'. In school the Three *R*s are (one hopes) still a core part of the curriculum. Involvement in distributed information processing can be equally educative, but here the Three *C*s which form the title of this section are, I would suggest, more appropriate:

- Is the proposed system suitably *compatible* with currently installed and envisaged local and remote facilities and with established and planned information handling procedures? (A distinction needs to be drawn between connectivity and compatibility. Equipment may be capable of connection but may not be compatible to the degree required.)
- Are the features offered sufficiently *complete* to satisfy requirements?
- Will it and the supplier provide *continuity* of development and support into the future as the technology advances?

The user should seek tangible evidence in support of claims made and identify any deficiencies.

Substantive and sometimes intractable problems may be encountered when attempting integration. In the past such problems have not impacted directly on the end-user since computing power was the prerogative of the

centralised data processing department. It was here that differences in computer architectures, operating systems and so on had their effect.

As hardware costs have fallen and computing power per pence has increased, more users have been able to justify the costs of acquisition to the extent that computers are now household items. In certain respects distributed processing has gone full circle, since the family member or businessman with a stand-alone micro is in a similar position to the early DP specialist with his considerably more massive machine of probably less power. The incompatibility problems are much the same but are many orders of magnitude more numerous due to the vastly increased numbers of different hardware, software and communication products on the market.

Furthermore with the coming of office systems, the traditional centralised data processing department has been faced with problems which contrast sharply with those to which it has been accustomed. The new challenges are likely to include a vastly increased user population (comprising both computer literate and illiterate users), connection to and support of other manufacturers' equipment, improved system response times and availability, links to public networks and the need to handle more complex data flows involving voice, image (bit-encoded) and text (character-encoded). There is therefore an increasingly urgent need for standardisation to be achieved in the kind of areas noted in Figure 3.

Closer consideration of the areas instanced shows that some are technical in nature, e.g. network architectures[2, 38] and communication protocols,[39] while others are essentially intellectual, e.g. the application of data analysis to determine record types and data items in a database. Unfortunately when a computer-based system is being designed, developed and implemented, there is a danger that technical issues will take precedence, at least in the formative period, over problems which relate to the information to be handled and to the community of users.

Thus the decision to adopt electronic filing and retrieval via office automation may prove successful for internal paperwork created using the integral word processor but may fail as regards incoming correspondence in paper form. In such a case neither the electronic file nor the paper file will contain all the required material unless one or other of them is converted to the relevant medium and properly integrated. This will involve additional processing possibly using character-recognition equipment, document image storage and indexing. This all costs money and effort which may be difficult to justify at this stage in the development of the technology.

The design and development of library and records databases for several different manually-based units within an organisation would clearly be facilitated by the use of the same IR software. However, most of the commercially-available packages allow considerable flexibility in database design. Hence individually tailored solutions could be devised for each unit. This may be acceptable if there are no ready means for inter-unit electronic information flow.

Where telecommunication networks are available, then clearly it is

FIGURE 3. *Areas for possible standardisation.*

Hardware
Microprocessors
Plugs and sockets – types and sizes
Interfaces – to outside world (serial, parallel, etc)
Cabling
Memory available – RAM, ROM

Storage media
Type – floppy disk, hard disk, tape, etc
Size
Density – single, double, etc
Format – number of sectors/granules, etc

Data representation
Coding – ASCII, EBCDIC, etc
Character sets
Control characters – for word processing, etc
Records and data items – from data analysis, normalisation, etc
Encryption

Software
Operating systems
High-level languages
Compilers
Application software – both in-house developed and commercial

Telecommunications
Network architectures – e.g. SNA, DECNET
Addressing and routing protocols
Data link control protocols – for error control

User interface
Keyboard – layout, control and function keys, etc
Non-keyboard input/control – voice, mouse, light-pen, etc
Printers – paper sizes, typefaces, quality, controls, etc
Visual displays – legibility, columns/rows handled, resolution
Application interface – menu selection, query language, etc

preferable to adopt a suitably uniform design to facilitate access to and transfer between the various databases within the distributed network. It is in such circumstances that data analysis, involving conceptual and logical modelling and normalisation of the data, is essential. It also facilitates the transfer of data to any new database system. In a networked environment the database software must be capable of ensuring the integrity of the data when several remote users may access and have the authority to amend existing records or create new ones. With many

microcomputers accessing a central database it is preferable for validation to be undertaken at the centre and for downloading rather than uploading to be the main application of the PCs.

Commercially-available office systems, as exemplified by DEC's All-in-1 or IBM's DISOSS (Distributed Office Support System), are currently unable to provide sufficiently complete records management facilities. They may offer some retrieval capability on a limited number of attributes (e.g. title or subject of document, and filing or creation date) but overall they cannot deal with the requirement to store other important attributes such as retention periods or provenance details for records deserving longer term retention.

To satisfy such a need, additional information retrieval software has to be introduced and bridges built to enable records to be transferred from office system to database. The architectures involved with office systems, for example the Document Interchange Architecture (DIA) of IBM, may define a document profile which could include the required attributes for retrieval, but this will not necessarily have been implemented in the products themselves.

Where an IR system is employed it is preferable to consider it as storing a copy of the document rather than the original which may or may not be held in electronic form on the office system. This is chiefly because IR systems are not able to be operated in the kind of dynamic way required of a word processing centre where documents are amended and added to relatively frequently.

It is worth noting here that activities for which the user requires a fast response, for example document creation or graphics, will (or should) increasingly be done using a micro. This avoids delays introduced by telecommunication links to a mainframe or mini. On the other hand storage of created documents should be targetted at the central or shared larger computer which can offer more cost-effective storage as well as back-up and security for the information. It is also more likely that unauthorised access to the information will be minimised.

The above examples highlight certain information-related problems. Those of a technical nature have gained somewhat greater publicity. Incompatibilities still exist within the product ranges of individual manufacturers and the prospect of substantive standardisation between and across manufacturers is still somewhat remote.[40–42]

The range of standardisation includes:

- that which has wide international acceptance and enforcement such as the X series (e.g. communication interfaces for users' data terminal equipment and for data circuit terminating equipment) and the V series (data transmission over telephone circuits).
- that of individual companies such as the Ethernet local area network developed jointly by Xerox, Intel and Digital Equipment Corporation and the Systems Network Architecture (SNA) of IBM. Such products have wide acceptance and in many respects are de facto standards.

Of particular interest for the future is the X400 protocol which aims to overcome incompatibilities between commercially-available mailbox systems. These are used for integrated text, image and voice message transfer and cover links with telex, teletex and fax. The standard should be in force in 1985.

Some major standards bodies are listed below.

American National Standards Institute (ANSI)
: interests include the ASCII codes (American Standard for Information Exchange) and computer languages.

International Telegraph and Telephone Consultative Committee (CCITT)
: membership includes national PTTs (telecommunication administrations). Responsible for the 'X' and 'Y' series of standards, e.g. X25, and V24 (RS232/C).

European Computer Manufacturers Association
: wide ranging interests including data processing standards.

International Standards Organisation (ISO)
: establishes international standards and facilitates co-ordination of national standards.

An important consideration in networking operation is the 'Reference Model for Open Systems Interconnection' – OSI[2, 43] which is aimed at facilitating the development of communication standards. It defines seven communication layers ranging from the physical layer, through data link, network control, transport, session, presentation, and, finally, the application level. Although not intended as a rigid standard to be followed by all, it does provide a reference with which emerging products for interconnection can be compared.

Computer networks are an important area for standardisation and are aimed at providing any user from any point in the network with access to any other networked facility, e.g. a computer, storage device or printer.

Typically networks can be divided into two classes – local area networks (LANs) within a geographically-restricted area (e.g. a single building) or wide area networks (WANs) involving remote sites connected by public telephone lines. LANs will generally offer higher transmission speeds (several megabits per second), lower error rates and higher user concentration than WANs. As yet, however, user connection costs have not achieved the lower levels desired. Networks are therefore not necessarily as cheap to employ as a time-shared mini, though they may perform more efficiently and will increasingly become the preferred solution in the long term for appropriate applications.

LANS and WANs are not readily integrated with one another due to the differences noted above and hence intermediary gateways are required which convert the protocols (the sets of rules defining information flow in the systems).

A variety of LAN topologies will be encountered commercially (e.g.

star, loop/ring, tree, multidrop) as well as transmission media (e.g. coaxial cable, twisted pair and increasingly optical fibres). In addition networked systems will include those based on baseband (these employ digital binary transmission for encoding data directly on the line), broadband or PABX (private automatic branch telephone exchange being a circuit switched star network). The last two offer the possibility of integrating voice, data, text and video.

The picture is a confusing one for the intending purchaser who is seeking compatibility and standardisation. Undoubtedly the ISO Model will have a continuing influence on the development of local area networks[44] of which there are many on the market.[45] As examples a plug-in Ethernet (LAN) board for the IBM-PC has been announced which is claimed to provide software up to the fifth layer[46] and demonstrations of OSI interconnection have been given.[47] A growing body of user experience is available to help intending purchasers[48] who should, in general aim for products conforming to the ISO standard.

While the ISO standard provides guidance, manufacturers continue to pursue their own directions. The comment has been made that 'Until IBM decides, standards are a non-issue'.[44] Some have expressed concern that IBM's WAN-oriented SNA will have captured the market by the time the ISO model is completed.[49] Such concern will not have been alleviated by the announcement on 3 August 1984 of the British Telecom/IBM joint venture to provide a data network management service offering value-added network services (VANS) such as electronic mailbox and database enquiry,[50] although the application subsequently failed to obtain approval. Rivals ICL and AT&T have proposed a similar network more aligned with the ISO standard.[51]

On the local area network front, however, IBM's announcement[52] in May 1984 of its intentions fell short of the expected complete system which will not now be available until 1986 or 1987. Details were limited essentially to cable specifications.

As yet there is little software available which is designed for networked operation. The application of local area networks (LANS) for special libraries and information units is currently being investigated by Aslib and has included multi-user database software in its investigations.[53] Other studies include the Utah text retrieval project[54] which employs architecture that can be run on a single processor or as a distributed system, and TBIRD which allows much of the IR processing to be transferred to a personal computer from the timesharing mainframe.[55]

For office automation it is considered that significant progress on compatibility will not be made until the late 1980s. However, many manufacturers such as IBM, who have traditionally attempted to lock-in users to their own equipment – the closed system approach – are having to be much more open to allow 'foreign' equipment to be connected. This is coming about not only because of pressure from other suppliers and governmental organisations (e.g. the EEC), but also because it provides additional market outlets. Meanwhile there is a flourishing market in 'black

boxes' to provide protocol conversion which allows otherwise incompatible equipment to converse and interchange files.[42]

In the field of operating systems, hardware suppliers are adopting competitors' products to broaden their market prospects. Others are building bridges between operating systems. For example GEC recently anounced[56] Eunice which bridges VMS and UNIX and PCworks which links MS-DOS and UNIX. Multi-tasking PC operating software such as concurrent CP/M are essential if personal computers are to be intimately integrated with mainframe and mini operations and in LANs. In this context there is no future for single tasking products such as MS – DOS, PC – DOS or CP/M or for 8-bit micros.

However stand-alone micros with some communication ability for remote connection will continue to satisfy a wide range of requirements for personal computing. The value of the relatively inexpensive lap-type portable computer for mobile users should not be underestimated.[57, 58]

In general, however, standardisation in the computing field has a long way to go to satisfy the 'Three *C*s'.[59]

Implications

No attempt has been made in the foregoing sections to produce exhaustive lists of individual products relating to distributed information processing. They are too numerous to comprehend and many (if not most) of them will contribute little to the advancement of the technology. What needs to be appreciated are the general trends and the few significant individual contributions which have been and will be made by specific announcements and products. An example in this latter category was the production by IBM of their PC. Although not a leading-edge product, it undoubtedly brought some stability and authority to the micro market for the business user. This movement by IBM has been significantly advanced by their recent announcement[60] of the PC/AT which uses the advanced 80286 16-bit chip and multi-tasking software and will interface with their SNA systems (although the interface equipment is not yet available).

Factors which continue to contribute to the move towards distributed processing include:

- user dissatisfaction with traditional centralised DP units
- potential users increasingly have direct knowledge and experience of computing and the possibilities it offers
- continuing fall in hardware costs as computing power increases
- more user-friendly and user-helpful software becoming available including that designed for networking
- opportunity for end-users to have complete control over their applications
- improved telecommunication facilities.

Although this environment provides exciting possibilities for the end-user, it also creates increased problems of information management and control.

While the various traditional factions (DP manager, Office Manager, Information Scientist, etc) vie for ultimate control the users are busily and increasingly 'doing their own thing'. This may suit the users, but the organisation itself may suffer as incompatible system proliferate and the 'wheel' is reinvented again and again. Furthermore, the devolution of information-processing tends to undermine the effectiveness and validity of corporate data. Information management aspects will have been covered by other speakers and will not be pursued in detail here (see also references 61, 62). Suffice to say, to be effective such management requires board support and the formulation and promulgation of suitable policies covering both the technology and the information handled. Consideration will have to be given to such factors as company records management in the electronic age and the creation of databases using suitable software and development aids within a data administration framework.[63]

Overall a flexible approach must be taken as regards organisational structures and individual roles. Selection of systems will often involve inter-departmental project teams working within a matrix structure. Relevant knowledge and experience of activities in other parts of the company is likely to be a prerequisite for a successful outcome. Considerable emphasis will therefore have to be placed on education and training which will need to be regarded as a continuous exercise throughout one's working life.[64, 65]

The bottom line is that you get what you pay for. At least money is less likely to be wasted if questions of compatibility, completeness and continuity are properly addressed. Then even if the chosen system cannot satisfy *all* requirements, you will be moving in the right direction and not up a blind alley.

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Information management: taking account of the human element

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In what I have to say I have defined the human element as not including ergonomic considerations. I do this mainly because I know little about ergonomics, but also because there must be many people at this conference who know a lot more about it than I do. What I shall address myself to, is the possible social, including organisational, implications of the development of information technology – its psychological implications and its implications for implicit value choices concerning the sort of socio-technical systems we set up around the new technology.

In this I am strongly reminded of a research project I was involved in some years ago to do with work organisations at the coal-face. At that time a new technology had arrived that allowed change from the small work place to the longwall system of coal-mining. Because of the larger number of people involved and the mechanisation of much hand-work, it seemed to the mining engineers that the only appropriate model to apply was that taken from mechanical factory practice. They therefore introduced a system of single-task work groups each with a different piece rate, taking supervision away from the previously self-supervised work groups and setting up a system of supervision. Given that the work place was no more than 25 inches high, that it was constantly on the move, that there was always danger, including the possibility of the factory roof falling in, that it was completely dark with only miners' lamps to work by, this system could not have been less appropriate, if for no other reason than that supervision in these conditions was quite impossible. The early years of longwall mining were beset with low productivity and very bad industrial relations as a result. The possibilities from the full application of information technology seem to me to be even more of a change from the past than was the introduction of face machinery for mining. We should therefore be very careful in applying traditional models to the emerging situation without first considering their suitability. The new

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technology provides us with an enormous capacity for information-handling and so of automated control. It allows for much more explicit and detailed planning, for the real-time control of operations by computers, and perhaps most importantly, the possibilities of machines being able to take over and perform nearly all the industrial activities now done by human beings with even greater skill and reliability than we have known in the past. On the face of it it would certainly seem that our old social and organisational models are unlikely to be appropriate to the emerging situation.

It therefore behoves us to study the characteristics of the society that is to absorb and find an appropriate model for these new systems. We must take account of the current possibilities and limitations that our society and its work people now display. They would not seem to be as they were implied in the old models. The decades of post-war affluence, although overtaken by the growing awareness of raw material shortage, particularly energy, and by a very deep world depression, nevertheless seem to have left some changes in our values about work. There would seem to be a definite shift towards a more non-materialist set of values, certainly throughout Europe. An enquiry undertaken in several EEC countries, including the UK, disclosed that the majority in all these countries declared that they would prefer to have more leisure than more pay. This change in attitude was not confined to the younger generation, it was found right through all age groups. The same changes can be seen in the expressed wishes of young people entering work. The values that they hope to find in their working lives are such things as an intellectual challenge, the constructive use of time, to be dealing with people rather than things, and the opportunity for originality. The majority of them also say they would rather have self-supervision than high pay. This trend has also been confirmed among a group of recently-appointed company directors, the great majority of whom said that the advantage of their new role was not to do with increased income or status, but with the freedom it gave them to control their own time. We now look for personal and social satisfactions in our working lives as well as, and at times before the purely materialistic.

It would seem essential that we should keep these sort of changes in mind when we consider the working practices which are suitable to the new technology. It suggests we may need to grasp the chance to change radically what have been the norms in the past. Let us decide what we think is the decent life and arrange things accordingly, rather than what we have done in the past, which is to make the best life we can when all the technical requirements have been seen to. This is a point which the recent *Human Factors and Information Technology Report* of the National Electronics Council has made quite specifically. To quote from this report, 'To meet this challenge, everyone involved with information technology, from its original designers to its eventual users, needs to recognise that human factors should be the prime concern of any design decision. Information technology should be designed around the character-

istics and requirements of potential users, rather than being determined by what is technologically feasible, elegant or cheap'.

Traditionally our organisations have used a bureaucratic centralised model. The rationale for this has always been that only the centre could have all the information needed to have an overall picture and to appreciate what any action on the periphery implied for the whole organisation. Following this approach, activity becomes more and more prescribed as one approaches the periphery. When the first big computers arrived this situation was consolidated. It gave the centre even more power because that was where the computer was, with its capacity to provide even greater amounts of information more quickly. However, the development of microcomputer systems has changed that. Now, at least in theory, it is possible for the periphery to be as equally well-informed about the overall picture, as well as what is happening at other points on the periphery and the possible effects of interaction between such points. Thus the periphery of an organisation can now know as much as the centre, certainly at the operational level. Thus, in theory the periphery is now as well placed to take responsible decisions as is the centre. This would seem to suggest that for the sake of speed and adaptability decentralisation would be in order. This development, however, raises a very old problem. It challenges the traditional power structure of organisations. The senior central levels of our organisations have always effectively had all the power, which they delegate very carefully and in only the appropriate amounts needed for others to perform their tasks. It will not be easy for this model to change. Individuals and groups seldom give away power voluntarily.

There is a further problem concerning the improvements for the quality of working life that computerisation can bring. To quote my colleague, Professor Cherns, 'To the engineer, the perfect machine is the one that an imbecile could operate; he is surprised if the result is a machine only an imbecile is happy operating'. Already in some areas of application, the takeover of work and particularly the supervision and control elements of work, have produced negative reactions. This has been documented in warehousing, clerical work, and car assembly. Indeed some organisations have found that such applications are uneconomic and have redesigned work organisations so that some of these activities are given back to the work group.

I would now like to take up the question of the effects of the new technology on employment. At this point I would be very happy to be able to echo the hopeful sentiments we had from Sir Bruce Williams in his opening address. Unfortunately, experience to date gives no support to hopes that the process of the past, when the leading part of our economies moved from agriculture to manufacture then to service activities taking the mass of employment opportunities with them, will not happen again. The current change is one specifically designed, on the grounds of economy and reliability, to remove the elements of information-handling and control that in past systems human beings have always had to supply. It is true that in systems whose function requires a high level of information-

handling, which were obviously those first to apply the new technology, that human redundancy has not occurred to any significant degree. Thus banking which is an information-handling service was one of the first areas where the new technology was introduced. There were early fears this would lead to redundancy. This has not happened. The banks, partly through their own efforts and foresight and partly through a fortunately concomitant change in banking habits, particularly by the newly-affluent skilled working-class, have been able to expand their businesses. The result is that a banking work force of much the same size as it was before the technical changes is able to handle a work-load considerably greater than it could have done without the new technology.

In my own department we have seen the same thing. A few years ago we acquired two word processors. There were worries among the secretaries that this would mean redundancy. This has not happened. What has happened is that lecturers' notes, now on word processors, are much better amended and updated than they ever were before, and the department's recording and administration has improved enormously. As regards our administration there has been redundancy. We now manage with one administrator rather than one and a half. This is because administration, unlike academic activity which is pure information-handling, is like banking, a service activity. It uses information-handling as a means not an end. If this can be improved with new technology, redundancy does occur. Unless, of course, like the banks one can expand, but as I'm sure many of you here are aware, expansion in university departments these days is increasingly something that only the old and the middle-aged know about.

But when we leave the area of information-handling systems and look at the areas where the vast majority of employment opportunities exist in our economy, that is, the manufacture, storage and distribution of goods, and the service sector, the picture is very different.

I expect everyone here, has seen, as I have, some of the speculative models about the industrial scene in the future when the possible capabilities of the new technology have been fully applied. Many of these postulate a situation in which the machines do all the work, and the human work force comprises a small highly-skilled elite who set up, maintain, and service these intricate systems; on the other hand are all the rest for whom employment is not available, except for the few needed for drawing water, hewing wood, and sweeping floors. Professor Stonier of Leeds calculates that all our needs in the future could be met by a work force of only ten per cent of what we know today.

It is unlikely that such an extreme situation would arise, but if the possibilities of the new technology are to be exploited at all there is going to be a very serious crisis due to the inevitability of unemployment for a very large proportion of our population. This situation will pose a direct challenge to many of our basic social values.

We know from anthropology that all settled societies develop a rationale and a religious belief, or a combination of these, that justifies and supports

their way of life in their environment, and with the level of technology they have. What is more, if a society suffers a significant change it is quite capable of changing these basic beliefs to suit its new situation. Our own society has done this in its past. It happened in response to the tremendous need for labour that came with what we would now see as the primitive mechanisation of the industrial revolution. The then traditional beliefs of the Roman Catholic Church which had built into them a paternalistic and dependent relationship for individuals was no longer a useful set of beliefs to meet the new requirement. Up to that time, work was seen as nothing more than a necessity for living and it was largely self-disciplined – if you did not get the harvest in, you starved next winter. Work as such was not seen as a value in itself. So came the development of Protestantism. Protestantism postulates an independent individual who has to make his own way in life, and with its emphasis on original sin, he had to carry a great load of guilt without the support of confession and absolution. It also taught that the only chance for the individual to achieve eternal bliss was by toiling in the vineyard of the Lord on Earth. Not to toil was to feel guilty. Thus, work took on a moral value as something good in itself, a conveniently appropriate ethic to keep us all willing to undertake the long hours of toil that the new mechanical world required. This inevitably produced moral values about employment which was seen as what gave money and status to the individual, and moreover the lack of which, to be unemployed, left one feeling guilty and less than a full member of society. In this situation leisure had only a negative meaning, it was the time one had apart from one's employment. For our consideration of the future, perhaps the most difficult result of this was the equation that no employment equalled no right to an income.

If our wonderful new machines take over most of society's work, how are those for whom employment will not be possible, firstly, to have an income above a minimum dole and, secondly, how are they to fill their time and define themselves socially other than as scroungers and layabouts? This leaves us with a value dilemma. On the one hand we say why should such people have a decent income if they are not contributing to society's work; and on the other hand, there is the ethical problem that if society just cannot find work that would qualify people for an income, are they to be blamed and punished? Further, if what could be a majority of the population do not have significant spending power, who is going to absorb the things made by the machines and their attendant elite?

Coming to the particular situation in Britain at the moment, we know that there is a good deal of resistance, particularly from the unions in our older industries, against the introduction of the new technology. As long as the problem I have just posed is unsolved they are understandably unwilling to give up their jobs to the new technology. On the other hand, with other countries already exploiting the new technology, can Britain afford not to? This would seem to leave us with the dismal choice spelt out very sharply by Barry Sherman in a paper he wrote whilst Director of Research for ASTMS. In this he points quite clearly to what our options

are: 'We can ignore the technology . . . and have mass unemployment coupled with low growth, low productivity and low wages. Alternatively, we can embrace the technology with high growth, high wages, high profits, very high productivity . . . and mass unemployment.' It seems that whatever our reaction to the new technology we are going to have a very high level of unemployment. It has often been pointed out, that we look to be moving from the age of work to an age of leisure. As James Robertson insists, in industrialised societies we are indeed at a turning point. I also agree with Robertson that the only rational reaction is to face the facts and their implications squarely and not to deny them. Only by taking charge of the changing situation can we avoid waking up some day in the future to discover that as a result of a series of uninformed and expedient decisions we have landed ourselves in a world nobody wants but which nobody can change. The anodyne denial of the facts of the emerging situation is the surest path to such an outcome.

The greatest challenge we face is the removal from our lives of a preoccupation and a problem that mankind has from its beginning believed to be universal and abiding for all time. This is the economic problem, the problem of wresting an adequate living from our environment.

The perception of this is not new. In the depths of the world depression of 1930 John Maynard Keynes foresaw it with a greater prescience than one suspects even he realised. Let me quote from an essay written by Keynes in 1930 and addressed to us, living fifty years later. It is entitled 'Economic possibilities for our grandchildren'.[1]

'The prevailing world depression, the enormous anomaly of unemployment in a world full of wants, the disastrous mistakes we have made, blind us to what is going on under the surface – to the true interpretation of the trend of things.'

[Keynes then makes an analysis of what he sees as the true trend of things. He points to the developments of the capacity to produce wealth that was inherent in our economies at that time. In fact his guesses all turn out to be under-estimates].

> 'All this means in the long run *that mankind is solving its economic problem*, [Keynes' emphasis] . . . the point may soon be reached, much sooner perhaps than we are all of us aware, when needs are satisfied in the sense that we prefer to devote our further energies to non-economic purposes . . . this means that the economic problem is not – if we look into the future – *the permanent problem of the human race.* [Keynes' emphasis]
>
> 'If the economic problem is solved mankind will be deprived of its traditional purpose. Will this be a benefit? If one believes at all in the real values of life the prospect at least opens up the possibility of benefit yet I think with dread of the readjustments of the habits and instincts of the ordinary man, bred into him for countless generations, which he may be asked to discard within a few decades.

> 'The strenuous purposeful money-makers may carry all of us along, with them into the lap of economic abundance ... but the rest of us will no longer be under any obligation to applaud and encourage them for we shall enquire more curiously than is safe today into the true character of this "purposiveness" ... for purposiveness means that we are more concerned with the remote future results of our actions than with their own quality or their immediate effects on our environments ...
>
> 'Meanwhile there will be no harm in making mild preparations for our destiny, in encouraging, and experimenting in, the arts of life as well as the activities of purpose ... it will be those peoples, who can keep alive, and cultivate into a fuller perfection, the art of life itself and do not sell themselves for the means of life, who will be able to enjoy the abundance when it comes ... those walk most truly in the paths of virtue and sane wisdom who take least thought for the morrow. We shall once more value ends above means and prefer the good to the useful. We shall honour those who can teach us how to pluck the hour and the day virtuously and well, the delightful people who are capable of taking direct enjoyment in things, the lilies of the field who toil not, neither do they spin.'

Perhaps the hippies and flower people of the 1960s were telling us something more than either they or the rest of us realised. Yet consider too the reactions of irritation, anger, even fear that they provoked. To those, then as now, who have been reared with and have internalised the harsh values of the work ethic, to see it flaunted, and worse to hear its anathemas seriously praised is a fearful experience. It denigrates and denies all the values that are built into their character structures and which give them identity. A world that developed such values would continually disconfirm the meaningfulness of their inner worlds. They would feel psychologically threatened with destruction. I expect that many here have had some experience of this in the over-determined heat and viciousness with which a bar-room orator will attack welfare scroungers and layabouts. Dread readjustments indeed! But if we are unable to provide for millions of people the access to income that employment gives, and if they are to have an acceptable life-style, which we will need them to have to keep the system going, do we have any other option than to change very drastically our values about work and what we now call leisure?

There are two other considerations that illustrate the Pandora's Box nature of the new technology. The first has to do with the world's resources. Ever since the first Club of Rome Report in 1972 and the world energy crisis of 1973 we have all become aware of the finite nature of the world's raw materials of all kinds. Ecologists have warned us and science-fiction writers have frightened us with pictures of a future in which the world's resources have run out. Indeed, there is no shortage of doom merchants who tell us that whatever we do in the way of cosseting the world's

resources, of finding substitutes and of full-scale recycling, that such measures will only delay the inevitable. Now if there is one thing that will surely speed up this fearful process, it is the full application of the possibilities of the new technology. This may provide us and our children with a life-style fit for the Gods, but it will leave a very empty cupboard for our grandchildren.

The other problem is to do with the fact that the new technology has been developed, and will initially be used, by the present industrially-developed societies; what the Brandt Commission referred to as the North which comprises only 25 or 30 per cent of mankind. We do increasingly live in a global village and the new technology with its great communications power will further develop this tendency. The peoples of the South increasingly know more about the world as a whole and, as we know, their growing impatience with the homelessness, malnutrition and simple starvation, which they suffer while the North increases its affluence, often at the expense of the South, may well produce extremely unpleasant disturbances. Quite apart from ethical considerations, would the North not be inviting its own eventual destruction if we continue to increase our relative affluence while effectively ignoring the lack of basic needs among the majority of the world's increasing population?

I hope I have said enough to support at least a *prima facie* case that the new information technology contains the seeds of evil as well as good, that the management of its use calls for a universal and high degree of thought and care and that it may well demand from some, if not all of us, the need for unpleasant and even painful changes.

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Structural change within the information profession: a scenario for the 1990s

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Introduction

The development of electronic information technology and its increasing rate of adoption and implementation is having a major impact upon both the volume of information activity and the levels of employment in information related jobs.

Information technology, defined as both a cluster of product innovations and, in usage, providing the opportunities for a series of process innovations, is truly revolutionary in terms of its impact upon the nature and organisation of economic activity. Only our ability to assimilate quickly leads us to regard the changes which are currently occurring as being evolutionary rather than revolutionary in character. Put in a longer time perspective of industrial economic development it can be seen that the period during which information technology has penetrated the processes of producing both goods and services is very short indeed. Consider, for example, how many organisations possessed the following technologies a dozen years ago: electronic typewriters, dedicated word processors, micro-computers, facsimile machines, or link-ups to local area networks!

From a different perspective, Freeman[1] has defined a revolutionary innovation as one which affects virtually every economic sector in national and international economies. The revolutionary innovation is so far-reaching in its effects that the classification of economic sectors requires major, taxonomic revision. It also generates new inter-sectoral input-output linkages and permeates the economy to the extent that the geographic location of jobs may change, a theme which is mentioned in a later section.

Politicans as well as economists recognise the importance of information technology. Kenneth Baker, former Information Technology Minister, has said that he is absolutely convinced that information technologies will be the main motive force for economic development in the next twenty years. This conviction has, inter alia, led to the EEC agreeing to implement the Esprit programme of research in information technology which is to be

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financed to the value of £434m with a similar sum coming from industry (*Nature*, **308** (5955), 1984).

The major impact of information technology, at least as far as jobs are concerned, will be in its utilisation through process innovation. The manufacture of IT equipment is not of major interest to information professionals (but in any case its employment-generating potential is small). The usage of IT equipment is a different matter. However, because electronic information technology is a revolutionary innovation the types of jobs generated by its usage are likely to be very different, in certain aspects, to those involved in pre-electronic processes of gathering, storing, manipulating, retrieving, transferring and disseminating information. How will they grow in the future and who will do them?

Despite the rapid rate of adoption of information technology in many sectors of the economy, the potential of many recent technical innovations in this field has hardly been tapped. For example, despite the widespread usage of housekeeping systems within the library profession only a small proportion of the stock of information is stored in machine-readable form. One reason for this is the rate at which the labour force can acquire new skills to make such a system effective. The first constraint to 'change at maximum pace' is usually cost but this is closely followed by social and professional resistance to new methods. This latter problem has usually been resolved by aiming vocational training courses in new methods at the college and school leaver whom, it is widely believed, is more adaptable to changes in work practice and discipline. However, at a time of rapid technical changes the rate at which college and school leavers flow into the labour market is insufficient to restructure the skills of labour supply to meet labour demand. Consequently, adaptability and flexibility with the existing labour force becomes a key issue in determining rates of adoption of new work practices in different occupations.

Some of the analysis which is reported below shows that within the broader information environment there has been a fairly long-run increase in the number of jobs available to persons who are primarily concerned with generating, gathering, storing, manipulating, retrieving, transferring and disseminating information. Although these activities involve a wide range of occupations in most sectors it is useful to think of new jobs created by information technology as being susceptible to colonisation from existing occupations. A spectrum of occupations involving information work would include traditional librarianship skills at one end and computing skills at the other. It is very clear from the evidence that to date a majority of new information jobs has been filled by people from the computing rather than the librarian end of the spectrum.

This is hardly surprising since the very nature of many of the newly created jobs favours individuals with a technical education. However, with the growth of 'user-friendly' applications software, this need no longer be the case. The attitude of the existing labour force to these new opportunities will be more important in such an environment than the technical content of their secondary and higher education. In addition, the changing balance

of skills required to perform newly created jobs provides the opportunity to modify educational curricula and change the content of vocational training courses.

Changes of this type may well alter not only the rates of colonisation of new information jobs but also the spectrum of occupations from which they will be colonised. That is to say, new entrants to the library and information profession will almost certainly be more 'computerate' than those already in the profession. It is more difficult to speculate on whether or not a majority of the latter become more positively orientated to the new processes of producing information services.

An authoritive projection of the information environment in the 1990s must commence with an examination of recent and past changes in its volume of activity and levels of employment. This though is not easy to accomplish for the reason stated above; the implementation of a revolutionary innovation actually alters the taxonomic structure of economic classifications. Even when this problem has been solved, simple trend extrapolations cannot suffice as reasonable projections because of continuous innovation within the range of hardware, software, communications and peripherals products that impact upon the information economy. For these reasons, the remainder of this paper is ordered as follows. First, there is a brief section defining what we consider the information complex to be. This is followed by an outline of employment trends within the information complex over the period 1961–1983 which lays down broad parameters for changes likely to occur over the next ten years. Next, is a section which outlines in broad terms the technology facilitating changes in the information complex. A final section spells out the implications of these technical changes on the trends adumbrated in the analysis section and considers the probable effects on employment in the 1990s, more specifically in relation to the library and information profession.

The economic sectors and occupations of the information complex

It can be stated quite unequivocably that whilst many analysts and library and information professionals agree in broad terms as to what comprises information work, at a more precise level there are as many definitions as individuals tackling the definitional problem. There is no perfect resolution to this problem. It exists, in part, because 'information work' can be identified at different scales of aggregation. Individual tasks, which in aggregate define particular jobs can be classified as informational or non-informational. Jobs can be classified as being, on balance, within or outside the information complex. The goods and/or services produced by firms and organisations can similarly be classified.

Every job, simply because it requires mental recall at one time or another, embodies a minimal amount of information work. In our study at the Technical Change Centre (TCC) it was decided to draw the line between information work and non-information work on the basis of past studies and definitions. Furthermore, the TCC classification was made in

two dimensions, the sectoral and occupational. A detailed account of the classification outlined below can be found in TCC (1983)[2] which was itself based on Porat[3], Debons *et al*[4], OECD[5], Rubin and Taylor[6], and the ITAP report[7].

The sectoral classification is primarily based upon the ITAP report which dichotomises the economic sectors into information goods and services on one dimension and, 'enabling' output and 'content' output on a second. This produces four classes which have to be mapped onto existing taxonomie. The four classes are:

(1) goods content, such as electronic and paper printing and publishing;
(2) goods enabling, such as manufacture of micro-computers, VDUs and telecommunications equipment and the establishment of networks;
(3) service content, such as bureau services, broadcasting and libraries;
(4) service enabling such as interactive cable services, post and telecommunications services.

In practice this simple mapping cannot be achieved because in the UK, data relating to central and local government services which partially lie within the service content class and partially outside the information complex, cannot be further disaggregated. Consequently government has been included as a fifth class which can be regarded as being either within or outside the information economy. A sixth class comprises the residual of all economic sectors which are not primarily concerned with producing information goods or services, for example vehicle manufacture, retailing, etc. The industrial classification (incorporating government into the service content class) is shown in Appendix A.

At the scale of individual jobs, the occupations to which all jobs are allocable can also be classified according to an information taxonomy. The TCC classification of occupations relied very heavily on the work of Porat. Modifications were imposed by the classifications used in the Censuses of 1961, 1966, 1971 and 1981; and the Labour Force Surveys of 1975, 1977, 1979 and 1981. The aggregate of information occupations were divided into the following classes: Scientific and Technical Workers, such as Social Scientists; Private Information Service Workers, such as accountants; Educators; Public Information Disseminators, including librarians; Communications Workers, such as journalists; Information Gatherers, including operations researchers; Search and Co-ordination Specialists, such as marketing managers; Planning and Control Workers, such as executive civil servants; Information Processors, such as typists; Machine Operators, including printers; and Telecommunications Workers. A more detailed description of the information occupations is to be found in Appendix B.

The cross-classification of information sectors and information occupations defines the possibility of four major employment groups:

(1) Information Occupations in Information Industries (or Sectors).

(2) Information Occupations in Non-Information Industries.
(3) Non-Information Occupations in Information Industries, and
(4) Non-Information Occupations in Non-Information Industries.

This paper details past trends in employment mainly in these four major groups since 1961. It is also possible to study the growth rates of each information occupational and industrial class which affect the structure of the information complex itself. Time allows only a brief mention of this aspect in this paper but it is as well to remember that the 'core' of the information profession librarians and information scientists are to be found in groups 1 and 2 above.

Past trends in employment in the information complex

The TCC classification of information workers was used on published datasets to analyse growth in information occupations and industries over the last two decades. Of the published datasets, the Census is the most comprehensive but has two disadvantages: it is generally only carried out every ten years and the classification of occupations it uses up to 1971 is non-standard and cursory. In fact, librarians and information officers are not given a separate occupational category in the census data until 1981. Hence the disaggregated occupational data produced by the Census can only be seen as a general indication of trends. On the other hand the Census uses the standard industrial classification which gives reasonable consistency up to 1981 and at least has well-documented changes.

The Labour Force Surveys (LFS) also provide a useful source of published data. These, however, are based on a ½ per cent sample of the population and only go back as far as 1975. The LFSs' main advantages are that they are conducted biannually and that they use standard occupational and industrial classifications.

Both the Census and LFS were used for analysing past growth in employment in information occupations and industries and hence to produce a base from which forecasting could be undertaken. In both cases a matrix of occupational by industrial classes was created using the previously developed TCC classification. This enabled the study of employment levels in the four major groups described in the last section.

Data from the 1961, 1966 and 1971 Census were used. Data from the 1981 Census are not published in the required form but aggregates can be used to compare with data from the 1981 LFS. The number of workers in the first three major groups, i.e. in both information occupations and information industries, in information occupations in non-information industries and in non-information occupations in information industries were enumerated. The workers not in either information industries or information occupations were the residual. The number of workers in each information occupation in each of the information industries was collected together with the total number of workers in each information occupation and industry. The number of non-information workers by industry and

occupation was calculated as the difference between the total workers and the number of information workers.

All data are based on a 10 per cent sample of the population as this is the sample size used to compile the required tables in the Census.

Figure 1 shows information and non-information workers by industry and occupation for each Census year. The figure is based on data for a minimum number of workers in information industries, excluding those in national and local government (MLHs 901 and 906). A maximum for workers in information industries which includes national and local government is also available[9] but shows much the same trends.

The figure illustrates the increasing importance of information-based employment during the period. In 1961 information occupations accounted for 6.19 million workers, 26.5 per cent of the total, but in 1971 this had increased to 7.25 million, 30.5 per cent. Despite the decline in overall employment between 1966 and 1971, that in information occupations continued to rise both in absolute terms and relative to non-information occupations. Although employment in information occupations grew in absolute terms (from 2.67 to 3.29 million workers), its relative share in information industries declined from 1961–1971 from 58.8 to 56.7 per cent to the benefit of non-information occupations. This paradox is probably explained by the way that companies and industries expand. Firms that are classified as part of the information industries group begin with a core of workers which are primarily catagorised within information occupations. As such companies grow, they will increase their employment of non-core workers, so the proportion of the workforce within information occupations will decline. If government is included in information industries, however, this paradox does not arise, employment in information occupations in these industries increasing from 53.3 to 53.7 per cent. In addition employment in information occupations in non-information industries increased from 18.7 to 22.1 per cent.

Considering the industrial axis, in 1961 information industries accounted for between 4.54 and 5.84 million overall employment. The proportion of overall information occupations in the information industries rose from between 43.1 to 50.3 per cent in 1961 to between 45.3 and 54.6 per cent in 1971. Employment in non-information occupations in information industries also rose, from between 10.9 to 15.9 per cent of employment in non-information occupations in 1961 to between 15.2 and 20.7 per cent in 1971.

Data from the Labour Force Survey shows what happened to these trends during the period 1974–1981. The datasets used were from the 1975, 1977, 1979 and 1981 Labour Force Surveys. These also provided information for the previous year so that a reasonably consistent set of annual data was available from 1974 to 1981. Over this period there were fluctuations in employment which are partly attributable to the trade cycle. This caused overall employment to rise steadily from a trough in 1975–1976 to a peak in late 1979.

To eliminate the effects of this and other problems associated with the

FIGURE 1. *Numbers of workers in information, non-information and all industries and occupations (in millions)*

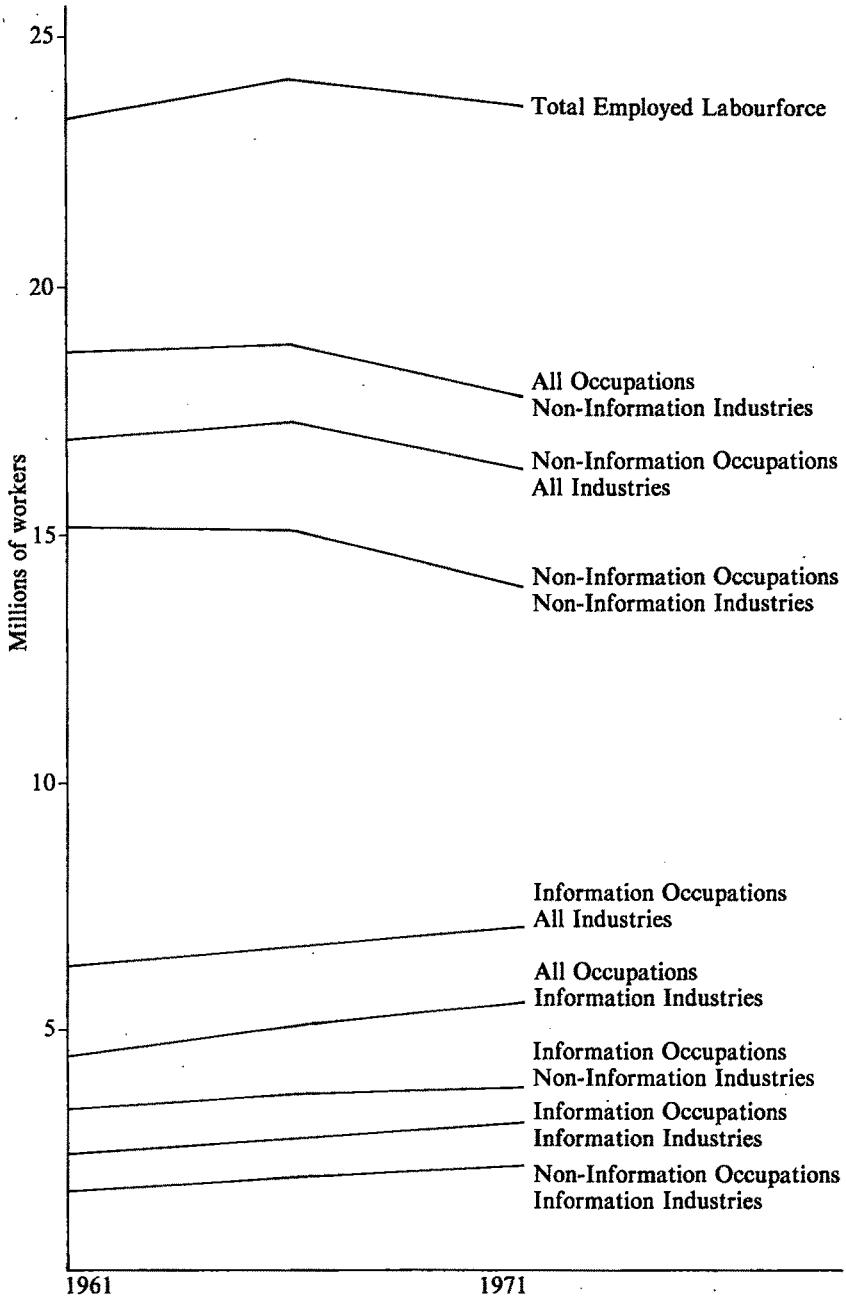
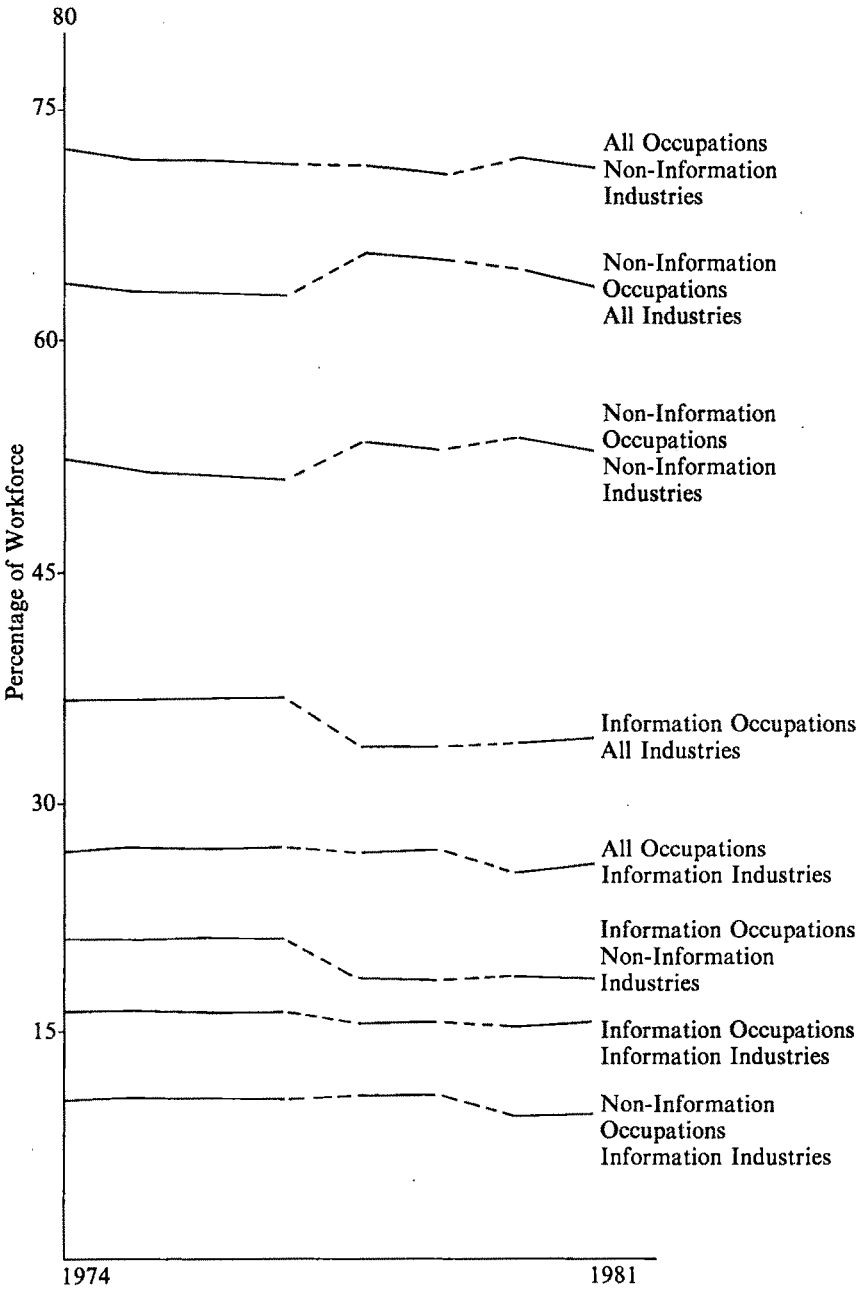


FIGURE 2. *Percentages of workers in information and non-information occupations and industries 1974–81*



data collection process used in the LFS (which causes under-recording of the workforce in the even years) data are analysed as a percentage of the total labour force for that year. These data are shown in Figure 2.

Between 1977 and 1978 there was a change in the classification of occupations used and between 1979 and 1980 there was a considerable change in the classification of industries. Apparent discontinuities in trends which occur between these years (see Figure 2) are a reflection of these changes of classification. In order to eliminate this effect the changes in percentages form 1974–1975, 1976–1977, 1978–1979 and 1980–1981 were analysed. These growth rates are shown in Table 1.

Table 1 shows that the share of total employment in information occupations has risen in each of the paired years. By contrast, total employment in non-information occupations, slightly decreased in each of the years and at an accelerating rate from 1976–1981.

The growth or decline of employment in information and non-information industries is more complicated because of the government figures. Overall employment in government increased over the first half of the period but decreased rapidly from 1975 to 1976, more slowly from 1977 to 1978 and increased again from 1980 to 1981. On the other hand total employment in information industries (excluding government) grew in each of the pairs of years discussed. The growth rate decelerated over the first half of the period but was more than restored over the second half. Conversely the proportion of total employment in non-information industries (excluding Government) showed a decline in all years except from 1976 to 1977.

In 1974–75 non-information occupations were still growing at a faster rate than information occupations in private information industries. By 1976–77, however, this trend had been reversed and the proportion of employment in information occupations in private information industries grew at the fastest rate from 1976 to 1981.

When government is included in information industries, however, a different pattern emerges. The rapid growth of information occupations in government from 1974–1975 caused information occupations in information industries to grow more quickly. The sharp decline in overall employment in government in 1976–77 dominated the growth rates for this period and hence proportionately employment in non-information occupations in non-information industries increased the most. Analysis of changes in non-information industries shows that in all years except for 1976–1977 information occupations declined less quickly in these industries than non-information occupations. There is a general trend towards the decline of non-information industries which is generally greater in the non-information occupations than the information occupations.

To summarise previous changes in employment, Census and LFS data show employment in information industries to be growing at the expense of non-information industries which have in fact declined. Similarly information occupations have increased at a greater rate than non-information occupations which in fact declined during the late 1970s and early

TABLE 1. *Changes in Percentages of Information, Non-Information and Overall Workers*

1974–1975	Excluding Government in II		Including Government in II		Total
	II	N-II	II	N-II	
IO	1.78	0.72	2.41	-0.23	1.18
N-IO	2.39	-1.34	1.75	-1.38	-0.68
Total	2.00	-0.74	2.16	-1.08	

1976–1977	Excluding Government in II		Including Government in II		Total
	II	N-II	II	N-II	
IO	0.31	-0.19	0.10	-0.57	0.03
N-IO	0.26	-0.08	-0.62	0.16	-0.16
Total	0.29	-0.11	-0.20	0.09	

1978–1979	Excluding Government in II		Including Government in II		Total
	II	N-II	II	N-II	
IO	1.49	0	1.19	0.07	0.69
N-IO	1.16	-0.68	0.39	-0.59	-0.34
Total	1.34	-0.51	0.84	-0.44	

1980–1981	Excluding Government in II		Including Government in II		Total
	II	N-II	II	N-II	
IO	3.74	0.16	3.81	-0.97	1.79
N-IO	3.37	-1.74	3.37	-2.12	-0.91
Total	3.55	-1.26	3.59	-1.88	

Key
II = Information Industries
N–II = Non-Information Industries
IO = Information Occupations
N–IO = Non-Information Occupations

1980s. Paradoxically however, during the 1960s and early 1970s non-information occupations grew more rapidly than information occupations in private information industries. This trend was not reversed until the mid 1970s.

It is possible to obtain more up-to-date quarterly data for employment in industries from the Department of Employment Gazette. Errors of 1–2 per cent are introduced because the data is not available at a sufficiently disaggregated level. These data indicate, however, that the proportion of employment in information industries has continued to rise steadily although there is some seasonal variation.

While there is a general trend towards an increase in the proportion of information-related employment, the structure of the information complex itself is changing as the disaggregated information classes grow disproportionately to each other. Of the industrial classes the service content category is by far the largest in terms of employment of workers in information occupations. Moreover it shows the greatest increase in employment. Indeed the overall industry data is dominated by growth in the service content sector. The occupational classes show much greater variance. In the 1960s the fastest growth occurred in Class C, Educators. In the 1970s, however, three classes, Scientific and Technical Workers, Private Information Service Workers, and Planning and Control Workers showed greater increases in employment. Analysis of employment in the core information occupations, librarianship and information work is less reliable because of the smallness of the sample size. Generally however it showed an increase in the first half of the period followed by a slight decline in the second half.

These data, then, are used as the base from which forecasting can be attempted. Before making this attempt, however, it is necessary to look briefly at the technologies that are likely to have the most impact on employment trends in the future.

Information-handling technology

Many of the changes occurring in the information complex are being facilitated by the available information handling technologies. These so-called 'enabling technologies' are developing rapidly and the variety of their applications is increasing apace. Looking ahead to the end of the decade most of the changes will continue to be brought about by the applications of the currently available technology whilst the new technologies not yet on stream will exert only a minor influence on events.

Computerised storage, handling and retrieval of information is becoming standard practice. With advances in micro-processing technology computers are becoming smaller and cheaper despite increases in processing capacity. This means that the purchase of powerful processing equipment is now within far more organisations' and individuals' financial and structural limits.

As developments in networking progress there is a move away from

'stand-alone' equipment to integrated systems where the pieces of equipment are linked together via distributed networks. This arrangement results in a compact system with a very large overall processing capacity.

Complementary developments in storage technologies with the refinement of magnetic disks and the advent of optical disks have meant that vast amounts of information can be easily stored and readily accessed when required. Optical disks have very large storage capacities, can store graphical as well as textual and numeric information, are cheap to produce and allow rapid random access to all the information stored on them. Most of the disks currently on the market are not rewritable which means they are ideal for archival storage of material where it is an advantage to have a medium which does not allow the data to be altered. However, techniques to produce rewritable disks are progressing so that they will also be applicable for non-archival storage. The nature of optical disks suggests that full-text databases will also become much more commonplace.

Peripheral equipment is also improving with the innovation of high-speed, high-quality printers such as laser printers and sophisticated graphics terminals, graph plotters, etc. This means very good quality hard copy output of textual and graphical information can be produced at rapid speeds. At the other end, use of keyboards, light pens, touch sensitive screens, etc, enable all kinds of data to be input into the computer and manipulated around by skilled or non-skilled individuals. Printed information can be entered directly into a computer without rekeying with the use of Optical Character Recognition techniques. The text is scanned and converted directly into machine-readable form by this method, though it only works on specially prepared copy.

All of these developments in hardware are being accompanied by improvements in software. Systems software has improved greatly over recent years increasing the so called 'user-friendliness' of the systems. More and more 'off-the-peg' software is being produced. These packages are cheap to buy, relatively easy to use, and are being applied to a widening range of hardware equipment. As packages are produced for more and more applications they enable quite complex manipulation with virtually no knowledge of computer programming and rudimentary understanding of systems. In other words, the widespread application of software packages is opening up avenues for information handling by non-experts in all kinds of areas.

Whilst the increasing sophistication of both software and hardware is contributing greatly to changes in information handling practice at present, the developments in telecommunications technology will probably increasingly have the most impact in the future. The use of satellites enables the transmission of information across large distances and the use of optical fibres vastly increases the capacity of cable systems for carrying data. The growth of both types of system is progressing with direct broadcast services (DBS) and two-way cable systems.

The emergence of digital switching technology has meant that voice, text and data can be transformed into one form for transmission. Using

packet switching services (PSS) data can be transmitted to any destination, national or international. The national and worldwide telecommunications networks are now being joined by local area networks (LANS). These connect up computer systems within a given geographical and/or organisational environment to enable high data transmission rates at low costs. The use of LANS is increasing very rapidly and their potential for transmitting vast quantities of information is enormous.

The era of electronic delivery and messaging is upon us. Computerised telex enables the rapid transmission of text over long distances and facsimile machines facilitate the transmission of printed documents from one destination to another via telephone lines. With facsimile whole documents including diagrams can be transmitted electronically from a hard-copy version at the transmission end to a hard-copy replica at the receiving end.

Electronic messaging where memos, etc, are transmitted in electronic rather than paper form are becoming very popular, particularly in large office environments and on split sites. With the increase of desk-top terminals and the spreading of local area networks, many organisations now have their own electronic mailing systems replacing the need to send paper memos around or try to contact someone by phone.

The combination of developments in hardware, software and telecommunications does not mean that more information has suddenly sprung into existence but it does mean that it has become much more readily available and more easily stored, manipulated, retrieved, and transmitted. The application of information-handling technology has turned the production, provision and supply of information into big business. With online computerised systems it is becoming increasingly easy to retrieve external information to supplement the building up of internal databases of information. Advances in systems technology mean the external information can be downloaded on to internal systems and manipulated, however, there are legislative problems to be overcome in the application of this technology.

Looking at the technologies at the developmental end there is scope for more radical changes in information handling practices in the not too distant future. Speech synthesis and artificial intelligence (AI) are techniques that have the potential to revolutionise current practices. Whilst speech as an output from a computerised system is fairly well established using speech as an input is much more error prone. However, very rapid advances are being made with this. Similarly, techniques for spelling detection and correction are improving. But the use of AI and the improvement of expert systems must lead to the major changes of the future.

At present systems are more powerful and more 'user-friendly' than they have ever been and this trend will continue. Moreover its impact on the skills and manpower required to work with the technology is decisive. A workforce with systems knowledge and management skills is very much in demand. The role of that workforce is becoming much more advisory in nature as the 'end-users' of the information begin to interact more

closely with the technology itself. The shift is very much towards a more 'information aware' society.

Future trends in employment in the information complex

Changes in the aggregate structure of those in employment are forecasted to continue changing on the basis of trends identified over the period 1961–1981. Changes within the more detailed information industry classes and occupation classes have been extrapolated on the basis of data recorded for 1961 and 1979. Information for 1981 has not yet been embodied in the extrapolations for the more detailed groupings.

Perhaps the most significant change from 1961–1981 was the reduction of employment within non-information categories from 61.8 per cent of the labour force to 50.24 per cent. A continuation of the established trend will reduce this percentage still further to between 45.04 per cent and 45.89 per cent in 1990 and further still to between 42.15 per cent and 43.48 per cent of the employed labour force by 1995. By any standards this represents a dramatic shift in the structure of the labour force.

The concomitant increases in labour force percentages are to be found in each of the other three major groups, i.e. information occupations in information industries, information occupations in non-information industries (both of which are of relevance to professional information scientists), and non-information occupations in information industries. This will be the case whether or not government is included within information industries.

The percentage of workers employing their information skills in information industries, which was 13.35 per cent in 1961 and 20.41 per cent in 1981 (including government) will increase to between 23.59 per cent and 23.78 per cent in 1990 and 25.35 per cent and 25.65 per cent in 1995. The percentage employing these skills in non-information industries, which was 13.17 per cent in 1961 and 14.34 per cent in 1981 will increase more gradually rising to between 14.75 per cent and 14.87 per cent in 1990 and between 14.98 per cent and 16.16 per cent in 1995. This more gradual increase is accounted for by the fact that overall non-information industries will continue to lose their share of total employment. These sectors which in aggregate employed almost three quarters of the workforce in 1961 will only employ between one half and two thirds in 1995.

In fact, employment in non-information occupations in information industries will grow more rapidly than employment in information occupations in non-information industries. Including government in the information block, non-information occupations, which have already experienced an increase over the 1961–1981 period from 11.7 per cent to 15.0 per cent, will account for between 15.6 per cent and 16 per cent of jobs in 1990 and between 15.9 per cent and 17.3 per cent of jobs in 1995.

The underlying pattern is clear; the fastest percentage growth quadrant is workers with information occupations employed in information industries and the fastest declining is that containing non-information workers in

non-information sectors. However, this does not mean that those currently engaged in the core information occupations, librarianship and information science, have experienced a proportionate increase in employment opportunities. Most of the growth to date has been within 'fringe' information occupations and this pattern will continue unless radical changes occur within the core professions. This point will be developed below. First though, we present an analysis of changes in the component categories of the information industries based upon 1979 Labour Force Survey data which is the most recent data set utilising the 1968 Standard Industrial Classification.

To what extent have the five groups of information industries experienced comparable rates of employment growth? Has each group experienced a faster than average increase in employment? Are there significant variations between the groups as there are between non-information sectors? What are the implications for the future? These questions are answered next. However, it must be mentioned that they cannot be addressed with precision because of changes in both the industrial and occupational classifications.

Over the period 1961–1979 the goods enabling group of industries' employment increased by 30,800 only from 689,600 to 720,400. This represents a compound growth rate of only 0.24 per cent p.a. which is less than the average for the economy as a whole as well as the rate for information industries. At the start of the period this group accounted for 11.80 per cent of employment in the information industries but only 8.49 per cent at the end of the period. More dramatically only 1.2 per cent of the increase in employment in information industries occurred in the goods enabling group.

A faster rate of growth of output compared to employment is reflected in a change in the occupational structure of jobs in the goods enabling group. Whilst jobs in information occupations grew from about 27 per cent to 40 per cent of the group total non-information occupations experienced an absolute as well as relative decline decreasing from 504,300 in 1961 to 433,500 in 1979.

Although the goods enabling group experienced a decline in percentage of employment in information industries its percentage of total employment remained almost static at nearly 3 per cent. If this trend were to continue through the 1990s and to the end of the century the group would be characterised by a small increase in employment if total employment increased. A more important change in the complexion of employment within this group is likely to be a continuation of the substitution of jobs in non-information (production) occupations by jobs in information occupations.

Employment in the goods content industries remained almost static over the period 1961–1979 increasing from 390,800 at the start of the period to 392,600 at the end. The compound rate of employment growth of 0.03 per cent p.a. was less than the average for all employment and the lowest rate of change of the five groups of information industries. Nonetheless,

although employment in the goods content group does not compare favourably with other information industries it reflects a more stable situation than that which occurred in the mainstream of manufacturing industry.

The goods content industries would; if current trends persist, experience a small decline in percentage employment reducing from 1.61 per cent in 1979 to 1.57 per cent in 1990 and 1.56 per cent in 1995. However, take-up of new technology products and the potential growth of electronic publishing militate against this past trend. Although the goods content group of industries are not labour intensive it is likely that employment in this field will stabilise or even increase slightly over the next ten years. The precise trend will be determined by the marketing and take-up of a new generation of information products.

Employment in the service enabling group of industries was 355,700 workers in 1961, and numbered 466,000 in 1979. The compound growth rate over the period was 1.51 p.a. This was faster than the average for all employment but below that for employment in the information industries. The increase in employment opportunities in this group accounted for only 4.2 per cent of total increased employment in the information industries. This is not entirely surprising because during the period, these services, which are primarily concerned with the movement of information underwent considerable changes in process technology. Telecommunications in particular experienced intense capitalisation and increased its share of interpersonal communications at the expense of postal services, which nonetheless were increasingly mechanised throughout the period.

The service enabling group was, in both 1961 and 1979, characterised by having the highest proportion of its workers in information occupations of all information industries. The recorded decline, from 90 to 86.5 per cent was most probably due to discontinuities in the occupation classification.

Although service enabling industries experienced a declining percentage of information industry employment their share of total employment increased from 1.52 per cent in 1961 to 1.92 per cent in 1979.

If this trend were to continue, by 1990 the service enabling industries would account for 2.16 per cent of the employed labour force, a percentage which would increase to 2.28 by 1995. It is possible though that there may well be an accelerated rate of employment growth in the sector but this depends very much on the rate of convergence between computing and communications technologies and the rate at which local area networks are laid down. More realistically, these factors are more likely to have a multiplier effect on employment in the sector nearer the end of the century than the end of this decade.

By far the most important group of information industries is the service content group. It includes news agencies, online data services, broadcasting, the creation of custom software and many library services (the rest are in government). In 1961 the group accounted for 3.105 million jobs which grew to 5.196 million by 1979. This increase of 2.095 million jobs represents

a compound growth rate over the period of 2.91 per cent p.a. which is by far the highest rate of growth experienced either within the information industry groups or in the non-information industries. In 1961 jobs in the service content group accounted for 53.1 per cent of the information industry total. Because of rapid employment increase this share increased to 61.2 per cent by 1978. Furthermore, the additional jobs *created in the service content group accounted for 79.1 per cent of the total increase in employment in the information industries.* It is quite clear where both the lion's share of existing information jobs is to be found and where the potential for future increases is greatest. In many respects the growth of employment in this particular subset of service industry jobs illustrates the structural change which has occurred in the economy as a whole. Employment has shifted dramatically away from manufacturing industry towards service industry. Furthermore, within the tertiary sector the fastest rates of employment growth have occurred in the industries often described as professional and business sectors. The service content group as defined on our information classification is a good example of the type of professional and business service which has experienced rapid employment growth.

The occupational structure of jobs within the group has not altered radically. A small shift away from information occupations was recorded but, yet again, this may be more attributable to classification inconsistencies than substantive occupational restructuring.

In 1961 service content employment comprised 13.3 per cent of the overall total. By 1979 this had increased to 21.4 per cent. It cannot be sufficiently emphasised how significant a shift in total employment this reflects. In all probability no other small group of industries has seen its share of employment increase so significantly over such a short period. What is more, there is no evidence to suggest that the trend has moderated. The apparent slow down in the late seventies is, yet again, more attributable to inconsistencies in classification than a real slowing down of economic restructuring. This means that by 1990 the service content sectors will account for 26.3 per cent of all employment and by 1995 for 28.6 per cent.

The final information industry group, government, was analysed separately because it was not possible to break down governmental activity.

In 1961 there were 1.306 million workers employed in central and local government. This increased to 1.716 million workers in 1979. The additional 411,000 workers were recruited to public service at an average compound rate of 1.53 per cent p.a. This is the second highest rate of increase of the five information industry groups, being second only to service content industries. However, this is to be expected given that much of government activity would, ideally, be classified as service content.

Paradoxically, although government experienced the second highest rate of employment growth, this was lower than the information industry average. Therefore, the share of government employed within the information industries declined from 22.35 to 20.2 per cent over the period of analysis. However, government increased its percentage of total employment over the period 1961 to 1979 from 5.6 to 7.1 per cent. It is notoriously

difficult to project trends in a sector which is so susceptible to political influence. On current extrapolations, employment in this part of the public sector could increase to 8 per cent of the total by 1990 and 8.4 per cent by 1995.

Changes in employment by information occupation over the period 1961–1979 cannot be analysed with as much precision as employment in the information industries, except at the aggregate level.

In 1961 there were 6.187 million workers employed in the information occupations comprising 26.5 per cent of the employed labour force. By 1979 this total had increased by 1.983 million to 8.171 million workers (excluding those with poorly defined occupations), accounting for 33.6 per cent of the employed workforce.

Within the information industries employment in the information occupations in aggregate increased from 3.114 million or 53.3 per cent of the total in 1961 to 4.732 or 55.8 per cent of the total in 1979. Consequently 1.618 million or 81.6 per cent of additional information jobs were created in the faster growing information industries. Within this latter group jobs in information occupations were increasing at a faster rate than jobs in non-information occupations.

Within the non-information industries employment in the information occupations in aggregate increased from 3.073 million or 17.6 per cent of the total in 1961 to 3.438 million or 21.8 per cent of the total in 1979. This increase of 365,000 jobs in information occupations in the non-information industries represented 18.4 per cent of additional jobs in these occupations. However, the share of information occupation jobs was increasing faster in the non-information industries than the information industries.

In 1961 the most important information occupation class was information processors which employed 3.242 million workers. This number represented 52 per cent of jobs in information occupations or 13.9 per cent of all jobs. In 1979 this class accounted for 3.496 million jobs. This accounted for a reduced percentage of jobs in information occupations, 42.5 per cent, but an overall increase of total jobs, 14.3 per cent. The second most important group of information occupations in both 1961 and 1979 was planning and control workers. They increased in number from 704,000 to 1.260 million, an increase of 556,000 jobs. In so growing, this group of occupations increased both their percentage of jobs in information occupations (from 11.4 per cent to 15.3 per cent) and in the economy as a whole (from 3.01 to 5.15 per cent). Jobs in planning and control increased so rapidly that the increase within the group accounted for 28 per cent of all information occupation jobs created during the period.

The occupation group which ranked third in information occupations in 1961 was private information services with 621,000 workers. This total increased to 806,000 by 1979 but this represented a reduction in percentage of information occupation jobs from 10.0 per cent to 9.8 per cent and a slip in ranking to fourth place. The change of place in the rankings occurred with respect to educators who accounted for 8.2 per cent of jobs

in the information occupations in 1961 and 11.2 per cent in 1979. The actual increase of jobs was from 507,000 to 924,000.

If changes in the percentage of all information occupations were to continue to the end of the century, the rankings observed in 1979 would prevail. However, information processors would experience a reduction to 32.4 per cent of jobs whilst planning and control workers would experience an increase to 20.2 per cent. Educators could account for 14.7 per cent of jobs in the information occupations in 2000 whilst private information services would represent 9.7 per cent of the total. These four groups, which together accounted for 82 per cent of jobs in information occupations in 1961 and 78.8 per cent in 1979 would account for 77 per cent in 2000. This slight reduction overall would occur mainly through inter-occupational substitution. However, it must be stressed that the information occupations which form the overall index would account for a steadily increasing share of total employment by 2000.

Perhaps the most important thing to remember about the changes in employment within the various information occupation groups is not that there are variations in rates of change, but that the mix of skills required to carry out particular jobs (and therefore occupations) will change. There will be a degree of skill convergence as information technology permeates most, if not all, occupations. Currently, the typist and the librarian need to be literate, capable of understanding, using and managing filing or classification systems. Neither require the skills of numeracy of an engineer. By 1990, and certainly by 1995, it is probable that workers in most of the information occupations will be required to utilise a computer terminal. Although this may seem daunting, it is as well to remember that all airline booking-clerks can manage this task today. It will be additional skills and knowledge of information systems which will determine which individuals and occupations are most successful in colonising newly-created jobs in the expanding information complex.

To what extent will the availability of new software and the development of other IT products modify the projections described above? The answer to such a question requires a comprehensive study in its own right, so here we focus on the effects as they are likely to implicate the library and information profession.

One of the key features would appear to be reluctance amongst a majority of traditional information professionals to acquire the skills necessary to establish and operate computer-based information systems. The reason this is particularly critical is that such information systems have more widespread currency than historic methods of storing information. The computer-based system is not exclusively used for handling more permanent information of the type which librarians have traditionally dealt with. It is equally good at storing and updating ephemeral data of use to many organisations and individuals. Consequently computer-based systems have penetrated many organisations in many economic sectors. The cost of the company library and its general viability is no longer a major issue. This is because the cost of acquiring specialised books for



occasional reference is obviated. Low levels of usage of the library cannot be compensated for; the costs of library staff, rent, light and heating have to be paid. The machine-based information scientist can, when not answering queries using externally-based information systems tackle problems concerning internal company records to establish marketing databanks. The systems orientated skills of the contemporary information scientist have wide-ranging applicability. Consequently the individual's productivity and cost-effectiveness improves significantly.

Perhaps the two largest threats to growing employment opportunities for computer skilled information scientists are:

(1) The possibilities of continuing penetration of the profession by computer skilled staff.
(2) The impact of communications developments on the location of work. As it becomes increasingly possible to access data from more and more locations, many users of computer-based information systems may elect to perform information search and co-ordination tasks themselves.

Despite these reservations, the future employment prospects of information scientists with computer skills look good. Those for the more conventional librarian are likely to decrease steadily but will not, of course, disappear altogether

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Appendix A

Categorisation of Information Industries using the British SIC at the MLH and Activity levels

	1958 SIC MLH No.	1968 SIC MLH No.	1980 SIC[1] Activity No.
GOODS ENABLING			
Office Machinery	338	338	3301
Watches and Clocks	352	352	3740
Photographic and Document copying equipment	351 (also part 364)	351	3733
Surgical instruments and appliances		353	3720, 3731
Scientific and Industrial Instruments		354	3732, 3710, 3442
Telegraph and Telephone Apparatus etc	363	363	3441
Radio and Electronic Components	364	364	3453, 3444
Broadcast receiving and Sound reproducing equipment		365	3452, 3454, 3302
Electronic Computers		366	3433, 3443
Radio, radar and electronic Capital goods		367	see note 2
Paper and Board	481	481	4710
Manufactured Stationery	483/3[3]	483	4723
Miscellaneous Stationers' Goods	495	495	4954
GOODS CONTENTS			
Printing, Publishing of newspapers	486	485	4751
Printing, Publishing of periodicals		486	4752
Printing, Publishing of Books	489	489	4753
Other Printing, publishing, book-binding, engraving, etc			4754
SERVICE ENABLING			
Postal Services	707	708	7901
Telecommunications			7902
SERVICE CONTENT (see note 2)			
Cinemas, Theatres, Radio etc	881	881	9711, 9741, 9760, (part 4930)

	1958 SIC MLH No.	1968 SIC MLH No.	1980 SIC[1] Activity No.
Insurance	860-860/4	860	8200, 8320
Banking and bill discounting		861	8310, 8140,
Other Financial Institutions		862	8150
SERVICE CONTENT			
Advertising and Market Research	899	864	8380
Other Business Services		865	8395, 8394
Central Offices not allocable elsewhere		866	8396
Other Services		899	9611, 9631, 9690 (part 4930)
Accountancy Services	871	871	8360
Educational Services	872	872	9310, 9320, 9330
Legal Services	873	873	8350
Medical and Dental Services	874	874	9510, 9520, 9530, 9540, 9550
Research and Development Services	879	876	9400
Other Professional and Scientific Services		879	8370, 9560
National Government Service	901	901	9112, 9770,
Local Government Service	906	906	9111, 9120, 9130, 9140, 9150. 9190

Notes

1. The 1980 SIC has a very different structure compared to the previous SICs and the coding system is based on 4 rather than 3 digit numbers.
2. The correspondence between the 1968 MLHs and 1980 Activities as listed in the table are not exact but this is compensated for by the fact that although parts of an MLH may fall into different activities both activities will be under the same broad category (i.e. goods enabling/service content etc). Hence combined Activities 3452, 3453, 3443, 3444, 3433, 3302 and 3454 correspond to MLHs (1968) 364, 365, 366 and 367. Similarly with all the Service Content industries.
3. In a few cases in the 1958 classification it is necessary to go below the MLH to its sub-divisions. This is only possible where data is published at this lower level in the Census as is the case with those sub-divisions shown in the table.

There were some minor alterations to the definition of some of the MLHs

when reclassification took place in 1965. In most cases reallocations affecting the MLHs listed in the above table were to other MLHs within the same broad category as was the case with differences between MLHs and Activities (see note 2 above). Hence the reallocations will have a negligible effect on our results.

Details of the differences between the 1958 and 1968 classification may be found in Fothergill and Gudgin (1976), Appendix 8. Details of the differences between the 1968 and 1980 SIC may be found in *Standard Industrial Classification Revised 1980: Reconciliation with Standard Industrial Classification 1968* available from the Central Statistics Office.

The following industries, separated in only the 1980 SIC are excluded from the study for reasons of consistency (see Appendix 8).

2552	Printing Ink
3275/4 and 3276	Printing and Paper making machinery
8440	House and Estate Agents
8500	Owning and dealing in Real Estate
530	Retail Distribution of Books, Stationery and Office Supplies.

Appendix B *Occupation Classifications Prepared by TCC for use in the Study*

A KOSC Used in LFS 1979 and Census 1981
KOSB LFS 1977 } These are the same classification.
KOSA LFS 1975 }
B Census Classifications 1961, 1966 and 1971

The Labour Force Survey uses the Key List of Occupations for Statistical purpose (KOS) which was originally adopted for classifying occupations in 1970. The 1975 LFS uses the original standard classification KOSA which has nearly 380 occupations. There was no change in this for the 1977 LFS which used KOSB. The largest change was in the 1979 LFS when the number of categories was greatly expanded to over 500. This classification, KOSC was also used in the 1981 Census.

Appendix B1 consists of two tables showing information occupations classified into Porat's categories. The first table classifies occupations from KOSC and the second from KOSA and KOSB. Although the two tables appear to be similar there has been no data published to confirm this. (One of the experts in this field, Peter Elias, from the Institute for Employment Research, University of Warwick, agrees with us that these two classifications should be treated as separate.)

The earlier Census, however, used a different classification based on industrial sectors. There are only slight changes in this from 1961 to 1976. This classification mapped into Porat's categories is shown in Appendix B2.

In most cases Porat's classification was used and the Census and LFS Classifications were mapped into this but occasionally it was felt that the OECD classification was more appropriate.

Many of Porat's occupations are at a more disaggregated level than those of the KOS classification hence in several categories (particularly A and C) Porat has listed many more occupations.

Appendix B1

TABLE B1 *KOSC classified into Porat's Categories*

KOSC Code	*A.*	*Scientific and Technical Workers*
004	1	Economists, statisticians, (actuaries[1])
012	3	Social and behavioural scientists
024	1	Biological scientists, biochemists
024	2	Chemical scientists
024	3	Physical and geological scientists, mathematicians
025	0	Civil, structural, municipal, mining and quarrying engineers
026	1	Mechanical and aeronautical engineers
026	2	Design and development engineers (mechanical)
027	1	Electrical engineers
027	2	Electronic engineers
028	1	Chemical engineers
028	2	Production engineers
028	3	Planning and quality control engineers
028	4	Engineers nec
028	5	Metallurgists
028	6	Technologists nec
	B.	*Private Information Service Providers*
001	0	Judges, barristers, advocates, solicitors
002	1	Chartered and certified accountants
002	2	Costs and works accountants
002	5	Financial managers
002	7	Taxation experts
004	2	Systems analysts, computer programmers
009	6	Management consultants
013	1	Matrons, houseparents
013	2	Playgroup leaders
013	3	Welfare occupations nec
015	1	Medical practitioner
015	2	Dental Practitioner
017	3	Ophthalmic (and dispensing opticians)
020	1	(Artists[2]) Commercial artists
020	2	Industrial designers (not clothing)
020	3	Clothing designers
020	4	Window dressers
029	0	Draughtsmen
031	1	Architects, town planners
018	4	Professional and related in education, welfare and health

	C.	*Educators*
010	1	University academic staff
010	2	Teachers in establishments for further and higher education
011	0	Teachers nec
012	1	Vocational and industrial trainers[3]
018	3	Driving Instructors (not HGV)
	D.	*Public Information Disseminators*
009	4	Librarians, information officers
	E.	*Communication Workers*
005	2	Advertising and PR executives
019	0	Authors, writers, journalists
021	1	Actors, entertainers, singers, stage managers
022	1	Photographers, cameramen
023	2	Literary, artistic and sports workers nec[4]
	F.	*Information Gatherers*
002	3	Estimators
002	4	Valuers, claims assessors
003	2	O and M, work study and OR officers
006	1	Environmental health officers
006	2	Building inspectors
006	3	Inspectors (statutory and similar)
012	2	Education officers, school inspectors
031	2	Quantity Surveyors
031	3	Building, land and mining surveyors
138	7	Inspectors sorters in paper production, processing and printing
138	10	Weighers
151	1	Bus Inspectors
	G.	*Search and Co-ordination Specialists*
002	6	Underwriters, brokers, investment analysts
005	1	Marketing and sales managers and executives
005	3	Buyers (retail trade)
005	4	Buyers and purchasing officers (not retail)
057	1	Importers, Exporters, commodity brokers
	H.	*Planning and Control Workers*
003	1	Personnel and industrial relations officers[5]
007	1	General administrators – national government
007	2	General administrators – national government
008	0	Local government officers

009	1	Company secretaries
009	2	Officials of trade associations, trade unions, professional bodies and charities
009	3	Property and estate managers
009	5	Legal service and related occupations
009	7	Managers' personal assistants
009	8	Professional workers and related supporting management and administration nec
032	1	Aircraft flight deck officers
032	2	Air traffic planners and controllers
032	3	Deck, engineering, and radio officers and pilots, ships
034	0	Production, works and maintenance managers, works foremen
035	1	Managers in building and contracting
035	2	Clerks of works
036	1	Managers in mining and public utilities
036	2	Transport managers
036	3	Stores controllers
036	4	Managers in warehousing and materials handling nec
037	1	Credit controllers
037	2	Office mangers nec
045	1	Civil service executive officers
045	2	Supervisors of stores and despatch clerks
045	3	Supervisors of tracers, drawing office assistants
045	4	Supervisors of other clerks and cashiers (not retail)
045	4	Supervisors of retail shop cashiers, check-out and cash wrap operators
048	1	Supervisors of typists, shorthand writers, secretaries
048	2	Supervisors of office machine operators
048	3	Supervisors of telephone operators
048	4	Supervisors of radio and telegraph operators
052	1	Supervisors of postmen, mail sorters
052	2	Supervisors of messengers
054	1	Supervisors of shop salesmen and assistants
054	2	Supervisors of petrol pump, forecourt attendants
054	3	Supervisors of roundsmen, van salesmen
067	1	Housekeepers (non domestic)
093	2	Foremen – bookbinders and finishers
099	1	Foreman – compositors
099	2	Foreman – Electrotypists, stereotypists, printing plate and cylinder preparers
099	3	Foremen – Printing machine minders and assistants
120	4	Foremen – Telephone fitters
120	5	Foremen – Cable joiners, linesmen
120	6	Foremen – Radio, TV and radar mechanics
120	7	Foremen – Other electronic maintenance engineers
129	2	Foremen – Engravers, etchers (printing)

(This category of supervisors and foremen relies largely on the OECD categorisation on deciding which should be included and which excluded.)

I and J. Non-Electronic and Electronic Information Processors

046	1	Stores and despatch clerks
046	3	Other clerks and cashiers (not retail)
049	1	Receptionists
049	2	Typists, shorthand writers, secretaries
053	1	Postmen, mail sorters
053	2	Messengers

(We have excluded nurses from this study. The other occupations placed in this category by Porat are not separated in the KOSC classification and hence are included in other groups.)

K and L. Non-Electronic and Electronic Machine Operators

022	2	Sound and vision equipment operators
050	0	Office machine operators
051	1	Telephonist receptionists
094	2	Bookbinders and finishers
100	1	Compositors
100	2	Electrotypers, stereotypers, printing plate and cylinder preparers
100	3	Printing machine minders and assistants
119	0	Office machine mechanics

M. Telecommunication Workers

051	2	Telephone operators
051	3	Radio and telegraph operators
122	1	Telephone fitters
122	2	(Cable joiners, linesmen)[6]
123	1	Radio, TV and radar mechanics
131	6	(Wiremen)[6]

Appendix B2

TABLE B2: *KOSA and KOSB classified into Porat's Categories*

KOSA Code	*A. Scientific and Technical Workers*
011	Economists, statisticians (actuaries[1])
028	Social and behavioural scientists
053	Biological scientists and biochemicists
054	Chemical scientists
055	Physical and geological scientists and mathematicians
056	Civil, structural and municipal engineers
057	Mining, quarrying and drilling engineers
058	Mechanical engineers
059	Aeronautical engineers
060	Electrical engineers, electronic engineers and electrical/electronic engineers
061	Chemical engineers
062	Production engineers
063	Planning and quality control engineers
064	Heating and ventilating engineers
065	General and other engineers
066	Metallurgists
067	All other technologists
078	All other professional and related in science, engineering and other technologies and similar fields
079	Unidentifiable above but in 'Professional and related in science, engineering, technology and similar fields'
	B. Private Information Services
002	Judges, barristers, advocates and solicitors
006	Accountants
012	Systems analysts and computer programmers
029	Welfare workers
031	Medical practitioners
032	Dental practitioners
036	Ophthalmic and dispensing opticians
041	All other professional and related in education, welfare and health
042	Unidentifiable above but in 'Professional and related in education, welfare and health'
044	(Artists[2]) Commercial artists
045	Industrial designers
049	Window dressers
068	Engineering draughtsmen, architectural and other draughtsmen
071	Architects and town planners

C. Educators

024 University academic staff
025 Teachers in establishments for further and higher education, secondary teachers, primary teachers, pre-primary teachers, special education teachers
026 Vocational/industrial trainers[3]

D. Public Information Disseminators

017 Librarians and information officers

E. Communication Workers

014 Advertising and public relations managers and executives
043 Authors, writers and journalists
046 Actors, musicians, entertainers, stage managers
047 Photographers and cameramen
051 All other literary, artistic and sports
052 Unidentifiable above but in 'Literary, artistic and sports'

F. Information Gatherers

007 Estimators, valuers and assessors
010 Organisation and methods, work study + OR officers
018 Public health inspectors
019 Other statutory and similar inspectors
027 Directors of education, education officers, school inspectors
073 Quantity surveyors
074 Building land and mining surveyors
352 Bus inspectors

G. Search and Co-ordination Specialists

008 Finance, investment, insurance and (tax specialists[7])
013 Marketing and sales managers and executives
015 Purchasing officers and buyers
088 Managers – wholesale distributors
089 Managers – retail

H. Planning and Control Workers

000 Top managers – national government and other non-trading organisations
001 General, central, divisional managers – trading organisations
003 Company secretaries
004 Town Clerks and other clerks to local authorities
005 Secretaries of trade associations, trade unions, professional bodies and charities
009 Personnel and industrial relations officers and managers
016 Property and estate managers
020 Civil servants (administrative and executive functions nec)

021 Local government officers (administrative and executive functions nec)
022 All other professional and related supporting management and administration
023 Unidentifiable above but in project supporting management and administration
075 Aircraft flight deck officers
076 Air traffic planners and controllers
077 Ships masters, deck officers and pilots, ships radio officer
080 Production managers, works managers, works foreman, engineering maintenance managers
081 Site and other managers, agents and clerks of works, general foremen (building and civil engineering)
082 Managers – underground mining and public utilities
083 Transport managers – air, sea, rail, road, harbour
084 Managers – warehousing and materials handling
085 Office managers – national government
086 Office managers – local government
087 Other office managers
101 All other managers
102 Unidentifiable above but in 'Managerial' (excluding general management)
103 Supervisors of clerks
108 Supervisors of typists, etc.
111 Supervisors of office machine operators
113 Supervisors of telephonists, radio and telegraph operators
116 Supervisors of postmen, mailsorters and messengers
119 Sales supervisors
143 Supervisors housekeeping and related
210 Foremen – printing
216 Foremen – bookbinding
217 Foremen – paper products making
282 Foremen – installation and maintenance (electrical/electronic)

I + J. Information Processors

104 Clerks
107 Receptionists
109 Personal secretaries, shorthand writers and typists
110 Other typists
117 Postmen and mailsorters and messengers

K + L. Machine Operators

048 Sound and vision equipment operators
112 Office machine operators
118 Unidentifiable above but in 'Clerical and related'
211 Compositors

212	Electrotypers, Stereotypers
213	Other printing plate and cylinder preparers
214	Printing machine minders – letterpress, lithography, photograiner, and printing machine assistants, letterpress, lithography photograiner
218	Bookbinders and finishers
278	Office machinery mechanics
300	Engravers and etchers (printing)
	M. Telecommunication Workers
114	Telephonists
115	Radio and telegraph operators
283	Telephone fitters
284	Radio, TV and other electronic maintenance fitters and mechanics
285	(Cable jointers and linesmen)[6]

Notes to Tables B1 and B2

1. Porat classifies actuaries into Category B but we are unable to separate them from economists and statisticians.
2. Porat classifies artists as 'Communication workers'.
3. Vocational and industrial trainers were considered to be educators rather than counsellors. Porat classifies vocational and education counsellors in Category B.
4. This does not include managers of sports centres.
5. We have followed the OECD classification here which we feel is more appropriate to the British situation. Porat classifies personnel and industrial relations officers in Category B.
6. Not all of those included in these occupations are related to telecommunications.
7. Tax Specialists are classified into B according to Porat and KOSC.

TABLE B3: *Classification of Occupations from Census 1961–1971*

A. *Scientific and Technical Workers*

	Code No 1961	1966	1971
Civil, structural, municipal engineers	288	189	195
Mechanical engineers	289	190	196
Electrical engineers	290	191	197
Electronic engineers		192	198
Planning, production engineers			200
Metallurgists	291		202
Work Study, progress engineers[1]		193	199
Engineers nec			201
Technologists nec			203
Chemists		194	204
Physical and biological scientists	292	195	205

B. *Private Information Services*

	Code No 1961	1966	1971
Medical practitioners	280	181	181
Dental practitioners	281	182	182
Public Health Inspectors	285	186	190
Ophthalmic and dispensing opticians			186
Medical workers nec			191
Painters, sculptors and related commercial artists	295	198	208
Accountants, professional	296	199	209
Company secretaries and registrars	297	200	210
Architects and town planners			212
Surveyors[2]			211
Judges, barristers, advocates and solicitors	299	202	214
Draughtsmen	312	205	218
Officials of trade associations, professional bodies	310	203	216
Social Welfare and related workers			215
Professional workers nec	311	204	217

C. *Educators*

University Teachers	286	187	192
Primary and Secondary School Teachers	287	188	193
Teachers nec			194

D. *Public Information Disseminators*

There is no separate classification for librarians and information officers. Librarians are included under Professional workers nec (311, 204, 217). As the information profession is relatively young there is no reference to information officers in the earlier indexes.

E. *Communication Workers*

Authors, Journalists and related workers	293	196	206
Stage managers, Actors, entertainers (musicians)	294	197	207

F. *Information Gatherers*

Inspectors Supervisors Transport	198	125	123

G. *Search and Coordination Specialists*

	Code No 1961	1966	1971
Valuers[4], auctioneers; salesmen, services	239	153	150
Finance, insurance brokers financial agents[5]	238	152	149
Sales managers	276	178	179
H. *Planning and Control Workers*			
Deck, (engineering officers) and (pilots, ship)	190	117	115
Aircraft pilots, navigators and flight engineers	192	119	117
Traffic controllers and dispatchers, transport	200	127	126
Civil Service Executive Officers	222	142	
Civil Servants, local authority officials (so described)	223	143	142
Ministers of the Crown; MPs (nec) senior government officials	270	172	173
Local authority senior officials	271	173	174
Managers in engineering and allied trades	272	174	175
Managers in building and contracting	273	175	176
Managers in mining and production nec	274	176	177
Personnel managers	275	177	178
Company directors	277	179	
Managers nec	278	180	180
Office managers nec			138
I and J. *Non-Electronic and Electronic Information Processors*			
Postmen, mail sorters	203	130	129
Messengers	204	131	130
Typists, shorthand writers, secretaries	220	139	141
Clerks and Cashiers	221	140	139
Office Machine Operators[6]		141	140
K and L. *Non-Electronic and Electronic Machine Operators*			
Compositors	132	087	085
Printing Press Operators	133	088	086
Printers (so described)	134	089	087
Printing Workers nec	135	090	088

M. *Telecommunication Workers*

Installers and repairmen, telephone	051	028	025
Linesmen, cable jointers[7]	052	029	026
Telegraph and radio operators	202	129	128
Telephone operators	201	128	127
Radio and radar mechanics	050	027	024

Notes to Table B3

1. These are included in this category rather than F because they fall under this category in the 1960 and 1966 classifications.
2. Porat classifies surveyors in Category F but in the 1960 and 1966 Censuses this occupation is grouped with architects so we have categorised both occupations into category B.
3. Again, for reasons of consistency officials of trade associations etc. are classified in category B. Porat however, classified them into category H.
4. Porat classifies valuers in F but there is no separate class in the census.
5. Porat classifies financial agents in B.
6. Not all those in this category are telephone workers.
7. Porat classifies office machine operators in K and L and we would follow this except that in 1961 they were classified with clerks and cashiers.

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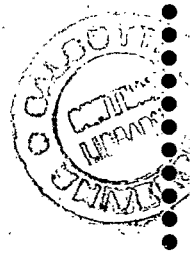
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Information management: the industrial need

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Paper presented at the 57th Aslib Conference, 'Information Management: Potential and Practice', University of East Anglia, Norwich, England, 18–21 September 1984.

Introduction

The First of January 1984 may well be recognised as one of the most significant dates in the evolutionary calendar of Information Management. On that date there came into force the first mandatory stipulation regarding the form that information would have to take. This event could well be the first of many that will force industry to make changes in the methods by which it produces, receives and stores information. This must, inevitably, require the provision of people aware of the impact that such changes will bring and who will be trained to respond effectively to those changes.

On 1 January 1984 the London and Scottish Clearing Banks, in a general move towards EFT (Electronic Funds Transfer), confirmed and implemented their original announcement of 1981 that every transaction passing through the Bank Giro (credit clearing) system would have to be machine-readable in one form or another.

This requirement has major implications for industrial organisations using the clearing system, since it is principally they which are responsible for issuing their own credit paper, much of which is currently not machine-readable.

The reason for this change to machine readability is that by the end of 1984 the number of paper vouchers exchanged through the banks' clearing system will have risen to the same level as that which led to the encoding and automatic processing of cheques which occurred some twenty years ago; that is, in excess of 2,000 million transactions per year or 8 million transactions every working day.

A further underlying reason behind the Clearing Banks' move towards EFT is that an increasing number of the credit items processed by the clearing system have originally been created electronically by computer, only to enter the system as hard copy (i.e. paper vouchers of one form or another) which requires expensive and labour-intensive re-translation into the clearing system's computer processing medium. It is the elimination of this paperwork which remains the major aim of the banking system

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and which appended to the paperless information transmission systems currently being developed by some manufacturing companies will complete a totally paperless supply/receipt environment.

Since virtually all industrial and business transactions eventually finish up as a bank transaction of one sort or another, the banking system not unnaturally represents the 'state of the art' for large volume electronic information transfer. Thus in this paper, I intend to:

- Examine in some detail the services offered by the UK banks to their industrial (as opposed to personal) clients,
- Describe the progress that the leading industrial companies are making towards taking advantage of these services and subsequently,
- Make some tentative suggestions as to what type of person will be required in the near future to work in this EFT environment and indicate what measures will need to be taken by educational establishments to produce these individuals.

Structure of the UK banking industry

At present the London Banker's Clearing House consists of ten banks, namely:

1. The Bank of England
2. Barclays Bank
3. Central Trustee Savings Bank
4. Co-operative Bank
5. Coutts & Co.
6. Lloyds Bank
7. Midland Bank
8. National Giro Bank
9. National Westminster Bank
10. William & Glyn's Bank

Membership of the Clearing House is distinct from membership of the committee of London Clearing Bankers (CLCB) which is a trade association of the major clearing banks who in turn are shareholders in the Banker's Clearing House Ltd which provides common services to all its members.

Services offered by banks to industrial users

Bankers Automated Clearing Services Ltd (BACS)

BACS has been in existence since 1969 and is the major clearing service for large corporate users such as industrial, business and service organisations.

Payments made through BACS are transferred directly into banks' accounts, or collected from them in the case of direct debits. In 1982 some 544 million items were processed by BACS representing some 12 million

items per week and a tenfold increase on the equivalent 1969 figure. It is anticipated that the annual total will reach 1900 million by 1990.

The major reasons for this growth in BACS transactions are:

1. Reduced costs in operating credit transfers, a few pence as opposed to from £1.60 to £2.00 by cheque.
2. Increased accuracy brought about by reduced manual intervention.
3. A three-day payment cycle which on Day 1, produces an input report which is available to the user at the start of business on Day 2;
   Day 2, allows users, furnished with the input report, to stop individual payments by phone virtually up to the opening of the payment day, Day 3;
   Day 3 simultaneously debits and credits payer's and payee's accounts by the opening of business at 9.30 a.m.

Types of payments and collections available within BACS are mainly:

monthly salaries,
weekly wages,
occupational pensions,
payments to suppliers,

and in addition:

grants and annuities,
Building Society interest,
savings deductions,
business expenses,
dividends,
Social Security Benefits,
Direct Debits.

The BACS clearing service is aimed principally at relatively large organisations; that is, for the benefit of non-personal account-holders of the UK banks. Its objective is to provide a fully automated interface between these organisations and their individual banks, a means of making payments without recourse to cash or paper (in the form of cheques or bank giro credits).

The data medium on which the BACS service was originally founded was magnetic tape as produced by mainframe and minicomputers but with the advent of microcomputer technology, floppy disks and cassettes can now be used. However, in the case of floppy disks BACS accepts only the 8-inch variety using a format which, fortunately, is virtually universal for this type of disk. Since most microcomputers use 5.25-inch disks though (for which there are up to 20 different formats) or increasingly 3.5-inch disks, agencies are now springing up to convert these smaller disks to the format required by BACS.

Online input to BACS by telecommunications began on a limited basis in 1978, and a fully interactive service is now available.

In addition to input data being prepared by users on their own computer equipment, more than forty computer bureaux regularly submit information to BACS on behalf of their users.

Electronic Funds Transfer at Point Of Sale (EFT/POS)
Whilst BACS is concerned mainly with what banks refer to as 'credit' transfers (i.e. credit to employee accounts or payments to suppliers), EFT/POS is mainly concerned with 'debit' vouchers as represented by the normal paper cheque.

Whilst not a paperless system, EFT/POS can reduce an organisation's payment costs by reducing the amount of paperwork being transported about the country in the form of cheques. Under this EFT/POS system, cheques are physically retained at the bank branch at which they are paid in, and the information encoded on each cheque is sent electronically to the account holder's branch where the account is debited. This is perhaps a half-way house towards total EFT but produces significant savings by avoiding the physical movement of vast amounts of paper.

AUTOPAY Service
Launched in July 1983, National Westminster Bank's AUTOPAY service is aimed at small businesses, Within a year the service has attracted 5,200 users generating 150,000 transactions per month. AUTOPAY provides small firms with a simple and inexpensive EFT service for repetitive payments such as payroll or settlements to regular suppliers. AUTOPAY offers an alternative clearing system for users who do not themselves wish to meet the exacting technical specifications of direct entry to BACS.

AUTOPAY essentially offers a service which converts hard-copy input of details of payments to be made into a magnetic tape for subsequent processing by BACS. By using an extensive 'library' of computerised records which hold all those details that a payer normally gives on bank giro credit vouchers with the exception of dates and amounts of payments, AUTOPAY cuts out the needless replication of information that occurs in normal paper credit voucher processing. It does not offer same-day clearance of debits and credits but is obviously attractive to small users who do not wish to produce machine-readable forms of payments information.

Clearing House Automated Payments System (CHAPS)
CHAPS provides a service to bank branches in the form of access to same-day clearance of large sums (in excess of £10,000). This service was previously only available as an unautomated system (known as 'town clearing') to a small number of branches within the City of London.

CHAPS is a service mainly used by the banks themselves, stockbrokers, foreign-exchange dealers, insurance brokers, and commodity dealers.

Society for the Worldwide Interbank Financial Telecommunication (SWIFT)
This service provides for the transfer of funds between nearly 1,000 banks in forty countries. Messages are sent from bank to bank at high speed,

but with complete security and at economic cost using advanced telecommunications techniques and a network with major centres in America, the Netherlands and Belgium. The daily value of the international payments passing through this system is in excess of £3,000m.

Additional automated bank clearing facilities
In addition to the facilities offered by BACS, EFT/POS, AUTOPAY, CHAPS, and SWIFT, several of the major banks together with independent agencies offer OCR (Optical Character Reading) facilities which can convert whole pages of payment instructions into a form suitable for direct input to BACS.

Industry's move towards a paperless transmission environment
Over the next decade, one of the main potential cost savings in manufacturing will result from the move towards paperless transmission of information covering finance and supply transactions between manufacturers, their suppliers and customers. Added to the savings that must accrue from more efficient processing of this information, the ready availability of particular elements of this information in electronic form will lead to increased control of inventories whose overall reduction in times of high interest rates is perhaps the area of largest cost savings available in the overall manufacturing process.

Automotive Industry Action Group – US
In the US the Automotive Industry Action Group (AIAG), supported by the five major US automotive manufacturers and their 28,000 suppliers, has established a three-year study programme which it is hoped will lead to the elimination of paper transactions in five to ten years producing a potential saving of $500 per vehicle thus representing a $5 billion saving on a modest annual 10 million vehicle build programme.

Society of Motor Manufacturers and Traders – UK
In the UK the Society of Motor Manufacturers and Traders (SMMT) are supporting a committee investigating the establishment of standard formats for paperless transmission and also a clearing house which could eventually co-ordinate the paperless supply and receipt process. Negotiations on co-operation on standards for paperless transmission of information throughout Europe are already in progress with this Group and their EEC counterparts, and although still at an early stage, these negotiations appear to have the support of all parties. Obviously many problems will have to be solved and much political good will invested in moving towards common standards (there are for instance 50 different bar codes currently in existence) if a rationalised paperless system for the transmission of supply and finance information is to be achieved throughout the motor industry.

Although difficulties obviously lie ahead for the implementation of such an enterprise, those involved are confident it will happen and at that stage linking into the various credit/debit facilities offered by banks will be an obvious final move to make the total system paperless.

GKN Stockpoint

Another example of the move towards paperless transmission of supply information in the UK – in this case between a supplier/manufacturer and its retail and wholesale customers – is the GKN Stockpoint system offering online availability of 25,000 parts to thirty-five physically remote depots. This system does not yet operate on a paperless basis but has all the potential for so doing in the near future.

The many advantages claimed for paperless transmission supply and receipt systems will not be complete if, at the termination of the process, the financial transactions concomitant on the supply and receipt information do not also take place paperlessly.

One would anticipate that over the next few years a rapid move towards completely integrated paperless supply/receipt credit/debit systems will occur within many industrial companies as well as other business organisations. Such systems will require that the individuals working in that environment should have a sound appreciation of the relevant language, requirements and facilities of Information Management.

Because the impact of these changes will be so broad, many of the people will not be specialists in information management but non-specialists earning their keep through some other acquired skill. To put those other skills to effective use, however, they will have to have a thorough appreciation of a paperless information environment and particularly the language requirements and facilities of Information Management.

Basic knowledge of Information Management

Language

All specialisms tend to adopt a vocabulary or language of their own to aid and improve communication amongst their own practitioners. When these practitioners need to discuss with non-specialists, however, a lack of knowledge on the part of the latter can cause great confusion, if not total lack of communication.

As an example, take the words used to describe the various levels of information, namely:

character
field
record
file.

How many students from faculties and departments in our higher educational establishments not specialising in some element of Information Management would be aware of what these terms referred to or could even sort them into their levels of importance? In my experience, very few.

In virtually any practical computer application, the size of the system has to be a function of record size and the number of records and if one starts without understanding the word *record*, little progress can be made. Subsequent discussions as to the further complications that might be brought about by 'fixed' or 'variable' record lengths obviously become a pipedream.

Follow this lack of understanding with size and measurement in terms of kilobytes, megabytes and gigabytes, and one starts to understand the sort of problems that might occur.

Requirements

One of the essential requirements of any information management system is the primary source of information input and more particularly the related skills required of the individual creating that input.

In theory, the following input devices for computers are possible:

QWERTY keyboard
mouse
touch screen
handwriting tablet (character-recognition pad)
voice-input

In spite of developments in the last four methods listed above, the QWERTY keyboard (sometimes supplemented by an associated numeric pad) is likely to remain the principal primary source of input to computer-based systems for some time. If this is the case, what keyboard skills do students possess when they leave school and does the situation improve when they leave higher education?

My experience is that keyboard skill of a reasonable level (say 4,000 characters per hour) is possessed by less than 10 per cent of school-leavers, and the percentage only improves significantly amongst students who have to use a keyboard as part of their undergraduate degree.

Some of the reasons for this general lack of keyboard skills can be found in a recent report to the Computer Board for Universities and Research Councils which stated that 'there is a critical lack of awareness in the academic community of the potential of the new technology and the likely changes it will bring to higher education'. This report went on to claim that in the next five years many universities will be caught unprepared between an incoming student population with a high degree of 'computer expectations' and the demands of employers who require to operate the latest technologies to stay in business. A figure of one terminal or microcomputer per ten students has been suggested as being necessary,

yet many institutions are way below this figure. Some of the reasons for this are:

- Concentration in the past of computers on research
- Lack of funds particularly for maintenance
- General lack of awareness amongst faculty.

Contrast this with the American situation where the acquisition of keyboard skills at secondary school is virtually universal and leads naturally to an early appreciation of computers and their capabilities.

Is it surprising that the Apple Corporation's Lisa design team found that a majority of British managers admitted to feeling embarrassed when using a keyboard in public!

In the UK the acquisition of keyboard skills *is* improving gradually, albeit through necessity rather than through any planned schemes either at schools or universities/polytechnics/colleges. Perhaps this general lack of keyboard skills amongst students is more than matched by members of the faculty, particularly in departments where computer skills are not regarded as routine tools of the trade and, hence, computer literacy given a low priority!

Facilities

A future environment of large paperless computer systems is one in which large amounts of industrial and business data will be stored in electronic form. For that data to be converted to information that can be used to manage the respective companies and organisations, a basic knowledge of what computers can do effectively – that manual record systems could not do previously – will be required by managers rather than computer specialists. This has been highlighted recently in the investigations of major crimes by regional police forces who have had to acquire not only appropriate hardware and software but also new investigative skills.

Some of the facilities offered by computers that need to be appreciated by non-specialists who have the skills to manage given they could obtain the relevant information are:

To sort in ascending/descending order on single/multiple keys.
To produce exception reports based on simple criteria.
To sub-total on the change of a sorted key.

The computer's ability to sort is a much neglected facility and fails to recognise the inevitable Pareto relationships which occur in the industrial and business world where typically up to top 20 per cent of customers/suppliers/stock-items represent 80 per cent of sales/supplies/stock-capital. I still derive great satisfaction from producing a 100-page print-out of stock-items sorted in descending order of value, subsequently to see the grateful recipient, after a little explanation and gentle persuasion, throw the bottom 90 pages into the waste-paper bin!

Whilst the ability to sort can be used to identify by exception as indicated above, so can the ability to identify records which do, or do not, meet

some simple exception criteria. Many of the most successful software packages are really no more than glorified record-maintenance systems capable of producing exception reports based on simple criteria.

The ability to sort combined with the ability to produce numeric sub-totals triggered by the change of a sort key offers great potential, particularly in financial control. Used intelligently, this facility can be used to identify revenue/cost sources/outgoings to support management action.

It could be argued that the ability of computers to sort, produce exception reports and triggered sub-totals will be known to software designers and, hence, will appear as Menu options within packages. This is true of the more obvious applications but I would argue that those managing large paperless computer systems must have knowledge of these abilities if they are to operate at their most effective. It is only these people who really know what they might require in terms of information from the system, and they will only be able to realise that information if they have a basic knowledge of how such information can be extracted.

DATA PROTECTION – A NEW REPORT

The UK Data Protection Act came onto the Statute Book in July 1984 after a long and turbulent passage through Parliament. This Act is an important piece of legislation which has provoked widespread discussion and analysis and which will have significant implications for many people in their professional and personal lives.

Before long, librarians and information managers will be confronted with the requirements of the Act in many applications where personal information is processed on computer. This applies to information about library users and staff; authors of books, documents and articles; and any other individuals with whom the organisation has contact.

Data Protection: A Guide for Library and Information Management is a major new report which provides a comprehensive study of the data protection issue and outlines international activity in this area. The Data Protection Act is examined in detail and the implications for the library and information community are analysed, with summaries of professional initiatives in this area.



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Setting up and running an information centre in a large UK chartered accountancy practice

Mollie Bickerstaff

Computer Audit Partner, Coopers & Lybrand, London

Paper presented at the 57th Aslib Conference, 'Information Management: Potential and Practice', University of East Anglia, Norwich, England, 18–21 September 1984.

Microcomputers, programming by end-users and the concept of the information centre, in a metaphor borrowed from aviation, are at the leading edge of information technology. This paper presents an account of the work done and experience gained in setting up a personal computing information centre within a large UK chartered accountancy practice, a profession not renowned for its pioneering tendencies.

Background

A few years ago, being possessed of some reasonable word processing services and an assortment of minicomputers, the partnership recognised that the time had come to co-ordinate our existing office automation and to make a much greater investment in information technology. This was partly because continuing improvements in technology offered greater productivity, a matter of tremendous importance to all whose businesses are based on selling the time of their professional staff, partly because the consultancy side of the practice was already growing significantly by means of selling office automation services to clients, so one could see it was a good thing, and partly because we wished to retain our edge in the market place, the competition being just as important in accountancy as it is in any other type of business.

A major project was put in train, associated with our forthcoming move into a new building, to ensure as far as reasonably possible that all aspects of our practice and our practice support services would be automated properly. It has often been said that if you tremble on the brink of investing in information technology, waiting for the next machine or the next software product, you will shiver there forever, never able to jump in. A better way to deal with continuing innovation must be to select a time that suits yourself, cover your eyes, jump in, and swim across to the other side. In other words, make an essentially arbitrary choice, take the plunge, and use the software, hardware, and methodology for as long as it works

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well enough. Then get out, look around, make the same sort of decisions, and jump in all over again.

Nevertheless, it is no small matter to select the best time and the best methods for that initial dive for an organisation as large and as diverse as ours. It was clear that years rather than months would be needed before genuine integrated office automation could be provided to all our staff, particularly in the more far-flung UK offices. We therefore decided that the best thing to do was to get on with it in the meantime, in a small way, using microcomputers.

At the time reservations were expressed. We were told that since the integrated office automation system was only just around the corner we would be wasting a great deal of money. We were told that since the fully integrated systems that would really make our people more productive would be working soon, all our proposed isolated pieces of software would be pointless, and would perhaps only serve to discourage the end-user. These were perfectly reasonable objections and we took them very seriously. We believe that we have resolved them successfully, as the rest of this paper will set out to show.

The Microcomputer Clearing House

Our intention from the beginning was to set up something we would probably now call an information centre. Ignorant, then, of that name we called it the Microcomputer Clearing House, abbreviated it to MiCH, and drew up the following list of jobs we believed MiCH should do:

- advise offices and departments on suitable ways to use microcomputers;
- review and approve proposals for acquiring microcomputers, within certain defined limits;
- develop standards and procedures for use of microcomputers;
- provide on-going advice and support to individual offices and departments using microcomputers;
- maintain records of microcomputers in the offices and obtain reports of usage and cost recovery.

Software:

- develop and improve standard Coopers & Lybrand microcomputer software;
- co-ordinate software developed by individual firms, offices and departments, ensure adequate quality and documentation and distribute the software within the firm;
- review software currently available on the market;
- maintain an internal list of C&L approved software.

Hardware:

- review hardware currently available on the market.

Co-ordination with the Office Automation Project

A great deal of work was going on to investigate and define the data processing needs of the whole business both in the medium and long term, so that the optimum systems architecture could be installed. It rapidly became clear that:

- the firm as a whole would benefit from a major information systems development effort based to a large extent on a central database and integrated applications;
- the greatest initial benefits would arise in administration and other service departments;
- the audit groups would need a partly decentralised distributed system with access, ideally, to:
  (1) the firm's databases;
  (2) the client's data files; and
  (3) certain external reference databases.
  However, the productivity gains here were not so obvious in the short term and the necessary software, being rather specialised, would not be easy to obtain.

In MiCH we saw an opportunity to pilot run many aspects of audit automation, using the results of the research work already in hand. We proposed to provide some packages and to develop some software over a limited period of time as an experiment, to discover whether even a simple free-standing micro installation could prove to be a cost-effective investment for an audit group and to provide prototypes for the larger audit automation project.

Constraints

Strict upper limits of cash expenditure were set. In the event, at £6,000 per installation, these proved not to be a limitation at all as prices continued to fall. The real constraints were a shortage of staff, our software development standards, and the condition we set that all interested users must first draw up a proposal, as noted earlier.

Staffing

The time needed to recruit and train suitable staff, in any discipline, is easily underestimated. We placed the control and management of MiCH in our computer audit technical support group, so we could draw on those resources, which continues to be a great advantage. Our staffing policy for MiCH is to use three people, one from an auditing background within the firm and the others with appropriate data processing experience. In practice, we have not yet had more than two people on the staff and have survived over long periods with only one. As the microcomputers began to spread and as we gradually issued more software out into the fields, so the demands for software and hardware support have grown.

Our experience so far has shown that:

(a) The support function alone can be a full-time job.
(b) Microcomputers and their associated peripherals break down a lot. The information centre staff must be able to deal with machine assembly and simple physical diagnostic checks.
(c) Constant interruptions to provide telephone support is a very good way to delay and frustrate programming work.

We have not solved but have contrived to dull the effect of these problems by:

(a) providing staff in the computer audit technical support department with enough knowledge and reference information to deal with the majority of MiCH support queries;
(b) issuing occasional memos in the style of a newsletter to let users know what is going on and what is planned;
(c) training some members of junior office administration staff, who join as school-leavers, to open up the machines and deal with the majority of installation and breakdown problems. This has been particularly effective, and it is noteworthy that the training was provided free of charge by our dealers, who also find it enormously beneficial that trivial problems should be dealt with and more serious problems properly diagnosed before equipment is sent back to their engineering department for repair.

Software development standards

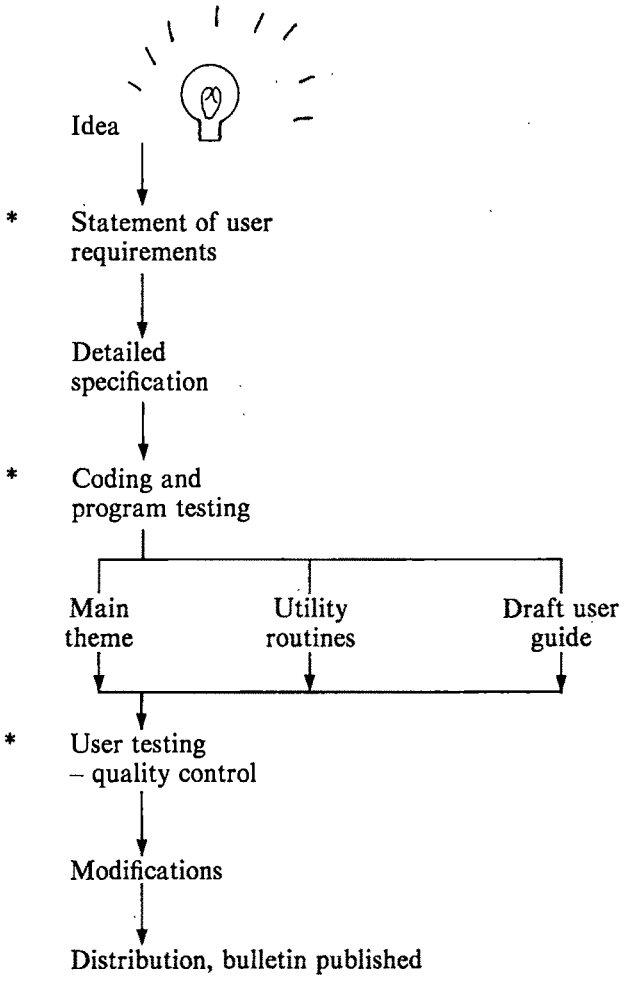
The textbook information centre is based on application generators to assist the end-user to program for themselves. It casts aside the traditional systems development life cycle where the user and the data processing service are separated, often with neither prepared to sign off each critical stage of development. The textbook information centre, with its executive workbench of powerful application generators and interrogation packages, will also generally have access to a central database and a mainframe. Setting up MiCH, we knew nothing of all that. What we did know, from years of computer auditing theory and practice, was that software development needs to be controlled. Further, we only had access to microcomputers, and the application generators available in the UK that would work on 128K floppy disc hardware were unimpressive.

We therefore began software development with a scaled-down version of a central data processing department. Coming from a computer audit background, we instinctively demanded control by division of duties but circumstances forced us to reduce this to a minimum.

Figure 1 shows a schematic overview of the MiCH software development life cycle. Control by division of duties should arise at three main points (asterisked on Figure 1):

(a) The original statement of user requirements must be drawn up by the appropriate user or team of users. The appropriate user

FIGURE 1. *MiCH software development life cycle.*



is generally not some middle-grade or junior member of staff, temporarily free from normal work and available to do whatever the software development team may want, but is ideally one or more senior and very busy people, at manager and partner level, who may have to be seduced into helping to draw up a good statement of user requirements. Rudimentary prototyping at this stage can be useful, helping people to formulate their own ideas and needs.

(b) Within the development team there must be someone to supervise the programming staff, to keep the project, no matter how small,

on the right lines and to the right scale, as well as performing a check to make sure the right testing is done and the system documentation is acceptable.

(c) Finally, and most important of the three, there must be quality control or user testing at the end of development but before the system, again no matter how small it may be, is issued on general release.

The acquisition proposal

The keystone of our policy has been only to supply a microcomputer with its related software in response to a well-defined request. The user must first draw up a proposal to convince us that they have sound practical plans for putting the equipment to use on their day-to-day client work, with a reasonable expectation of recovering the costs of the hardware and any externally purchased package software in eighteen months or two years at the worst. In convincing us, like Jiminy Cricket, they convince themselves as well, and that is the real objective of the exercise. We are not looking for major research work or exciting innovative ideas. We are simply looking to see that the audit group has organised itself to make good use of the new equipment and methods from the outset. We help them to draw up their proposals, offering as much information and assistance as they may need (see Table 1). The most important aspects of

TABLE 1. *The Proposal*

The proposal to purchase a microcomputer and initial software should contain the following information:

the partner and senior manager supporting the request;

your reasons for selecting the proposed software;

the intended uses of the software, analysed by client showing the estimated cost recovery against each one over the forthcoming year;

a cost justification for the equipment showing:
- initial cost of hardware and software;
- time costs in set-up and operation;
- estimated direct cost savings as a result of the equipment;
- how costs of the hardware and software will be recovered;
- time scale over which costs will be recovered (ideally the time scale should be one year, but should not exceed two years);
- other savings or benefits;

the appointed microcontroller and plans for ensuring that they will receive sufficient initial training.

the proposal are those dealing with the software, how it will be used and how, if appropriate, it will be developed or amended to suit the user's purpose.

In return, we supply the software and hardware within a fortnight, sometimes within a week. Such an unprecedented fast response has gained us a lot of goodwill and means that the interest stirred up by the proposal stage is not left to dwindle away. We provide an installation service visit, to make sure the new machine works properly, that all the right software is there in working order, and that the new users have a good idea of how to get started.

Thereafter, the only policing is a six-monthly review of cost recoveries against target. So far the cost recoveries overall have been on or above target, although some have more than recovered their investment already and one or two are lagging behind as yet.

The proposal must also nominate a person to act as the microcontroller (see Table 2). This can be almost anyone, provided they have the time and commitment to take on the following daunting list of responsibilities:

TABLE 2. *The Microcontroller*

A member of staff will always be appointed to act as the microcomputer controller for each MiCH microcomputer. The controller will be responsible for:

- scheduling the use of the computer;
- charging clients for use of the computer;
- controlling diskettes;
- ensuring that any faults are properly recorded, repairs are carried out and routine maintenance undertaken promptly;
- ensuring that there is a ready supply of consumables e.g. paper, diskettes, printer ribbons;
- physical security and confidentiality;
- arranging for initial training for each member of staff who needs to use the microcomputer, normally by supervised self-tuition;
- encouraging other members of the group, office or department to make a start on using the machine and to explain further ways in which it could be used in the practice;
- reporting to MiCH on:
  - cost recoveries;
  - any operating problems;
  - all local software development;
  - local experience with and comments on the MiCH software.

The microcontroller, whatever their grade, should be someone who is in the office sufficiently often to be able to fulfil all these duties properly. A good enthusiatic microcontroller makes all the difference between a successful profitable MiCH machine and a waste of money. We have found that most people underestimate the time and learning effort needing to be invested by the new microcontroller.

Training

In another unprecedented move, we launched a training programme aimed at the partners and directors, not at the staff. We ran a series of three-day hands-on courses which were a great success. They served to break the keyboard barrier and gained us a great deal of support exactly where we needed it, at the level of top management.

We then ran much the same course for all our audit group senior managers, with one major difference. Each senior manager also received a file called the Microcomputer Starter Pack. This is a complete teach-yourself introductory course on microcomputers. We asked each group manager to pass the Starter Pack round the members of their groups, aiming in this way to spread the value of the microcomputer course round all our audit staff.

Major findings

Despite the courses and the Starter Pack, results so far have shown that more training may be needed. A message relayed back to us loud and clear by the microcontrollers is that there is no substitute for being shown what to do by someone who knows, who is there at the time to stop you innocently doing something silly. Consequently, our microcontrollers feel they need more training themselves before they can teach others properly.

Our policy of asking for a formal proposal from prospective users has paid off very well, despite initial difficulties with some members of staff who saw it as overelaborate bureaucracy. Our practice of installing the machine within two weeks of receiving the formal proposal has also been well worthwhile. Early agreements, sensible purchase ordering, and a sound working relationship with our dealers has meant that we have always been able to supply a machine when it was needed.

The demands of the profession insist that we must produce software of the highest possible quality, capable of providing full evidence for any results that the auditor might be expected to rely on. To meet these demands we hold our software back from general release until it has undergone a reasonable level of user testing, which we insist must be performed by a typical user who has not taken any part in the development process. Circumstances and a lack of resources have compelled us to economise in most areas but we have found that final quality control testing is one where we must not cut back.

Like many in this field before us, we have found it profitable to exploit the enthusiasts amongst our users. These are the people whose ideas and

comments have helped us most to design and create useful software and to improve our existing products.

Above all else, the most important thing is to be able to provide the user with the right software to meet their needs. Sometimes that can be achieved by a proprietary package, but we have found that real productivity gains in the practice will only be achieved if we supply tailor-made high quality systems designed specifically to suit our professional staff.



Non-use of library-information resources at the workplace

a comparative survey of users and non-users of onsite industrial-commercial services

Margaret Slater

Under-exploitation of any service provided by an employer is a serious waste of organisational resources. It is therefore important to explore the reasons why people do not take full advantage of library-information services at the workplace. To this end Margaret Slater has studied three occupational groups (all in the industrial-commercial sector): chemists, engineers, and insurance personnel.

The qualitative study described in this report is set within the wider context of the whole potential user population. It does not focus solely on the non-user in isolation but contrasts the information-seeking habits, problems, attitudes, beliefs, and motivations of users, deliberate non-users, and enforced non-users (i.e. those who lack any library-information facilities at work).

Slater has isolated certain factors predisposing to unsatisfactory levels of usage and her results will be extremely useful to information providers. Management too should be equally interested in participants' comments on the causes and nature of more wide-ranging problems at work (not necessarily information-related).

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Information management and the consultant: towards the infallible expert

John Duke

Management, Educational & Training Consultant

Paper presented at the 57th Aslib Conference, 'Information Management: Potential and Practice', University of East Anglia, Norwich, England, 18–21 September 1984.

What factors may be considered most important when we seek advice of an expert consultant? What qualities in effect, may be expected as the consultant's stock in trade? I suggest that these may be broadly categorised as follows:

(1) familiarity with an appropriate and extensive database;
(2) shrewd analytic abilities and diagnostic skills;
(3) predictive abilities based on sound judgement (whether objective or subjective);
(4) presentational and explanatory abilities;
(5) successful record and high reputation.

The consultant may be expected to have access to a wide range of factual information in the chosen area of expertise, whether as tax lawyer or hydraulic engineer; the consultant must be aware of the availability of relevant sources that supplement the existing stores of information, and be familiar with the procedures necessary to explore these sources, i.e. knowing where to look and how to look. In short, the consultant should be furnished with a comprehensive knowledge base, up to date and constantly acquiring new information as it becomes available.

Using this background, the consultant's task is to investigate the current problem and clarify the relevant facts, teasing out the most pertinent information from the mass of evidence and opinion that often tends to occlude the real situation. Areas where further research and deeper analysis are needed have to be identified to provide the necessary data, and all this information has to be amassed in a logically structured manner so that an accurate diagnosis of the problem can be made and the basis of a solution formulated.

The diagnostic ability of the consultant and the consequent prediction of a recommended course of action depend largely on judgement of the situation, drawing on experience of similar occurrences and knowledge of precedents, but often requiring an element of choice. Paradoxically, outside experts are frequently employed on the assumption that their advice will

be 'impartial' and 'objective'. However, in almost all instances, elements of subjective judgement are inevitable, particularly in situations where there is conflicting evidence, or where new ground is definitely broken. The extent to which subjective influences determine the outcome of investigations is perhaps ill-recognised, least of all by consultants themselves.

Eventually, the consultant has to present recommendations to sponsors in a manner that they will find readily understandable and from which clear, positive actions may pursue. Some explanation of the argument on which the expert's conclusions are based is vital to demonstrate the level of confidence that may be placed on the findings. For although the expert may have been hired on account of an existing reputation and long record of achievement, this can be no excuse for authoritative pontification. Also, the expert's continuing success as a consultant is highly dependent on the reliability of recent judgements.

These, then, are the main aspects of the professional consultancy business and the question I wish to explore is how technological developments, particularly advances in the applications of information technology may assist in improving the effectiveness of the consultant's role making the operation more efficient, more consistent, more infallible.

For it is undoubtedly true that good consultants are rare; they tend to be busy people with demanding schedules and many calls on their time and energies; and, as a result, they naturally become selective by becoming expensive. They also, unfortunately, happen to be inconsistent, possibly as a result of the pressures they are under to deliver, but often because the processes by which they reach some judgements are not precisely quantifiable or have not been unambiguously identified. Regretfully, they are sometimes fallible; and all are mortal.

Developments in artificial intelligence have led to the emergence of a field of interest in what are broadly termed 'expert systems'. A useful definition of an expert system, for which I am indebted to Dr Max Bramer[1], is: *A computing system embodying organised knowledge about some area of human expertise, which enables it to perform as a skilful and cost-effective consultant.* To act, therefore, in a manner that will satisfy all, or most of, the criteria set out at the beginning of this paper. There is particular concern to elucidate expert systems that can operate in the following domains:

(1) where human judgement is imperative e.g. medical diagnosis;
(2) where the controlling factors are too complex to comprehend e.g. social security legislation;
(3) where urgent decision-making is of the essence in emergency or crisis situations e.g. nuclear accident.

What exactly is an expert system, and how is it constructed? How does it work? In essence, it is a set of computer programs designed to store a large amount of data, and to add to and modify this data from time to time; to interrogate and make exhaustive searches of this data at high speed;

to make precise calculations and to carry out out complex algorithmic procedures; but, most significantly, to carry out inference procedures, based on common-sense reasoning, logical rules, and deductive assumptions. In addition to these basic elements, an expert system will have a facility for demanding further information to enable it to refine its problem-solving capacity, and will be able to explain, or justify, its line of reasoning to the person using it. It operates through experiental knowledge, the 'art of good guessing', that human experts acquire over the years.

Fiegenbaum, perhaps the founding father of expert, or knowledge-based, systems describes the anatomy of an expert system (see Figure 1[4]) in the following terms:

Knowledge consists of two types of information; the commonly-agreed *facts* of the domain (these may be called objects), and a range of *heuristics*

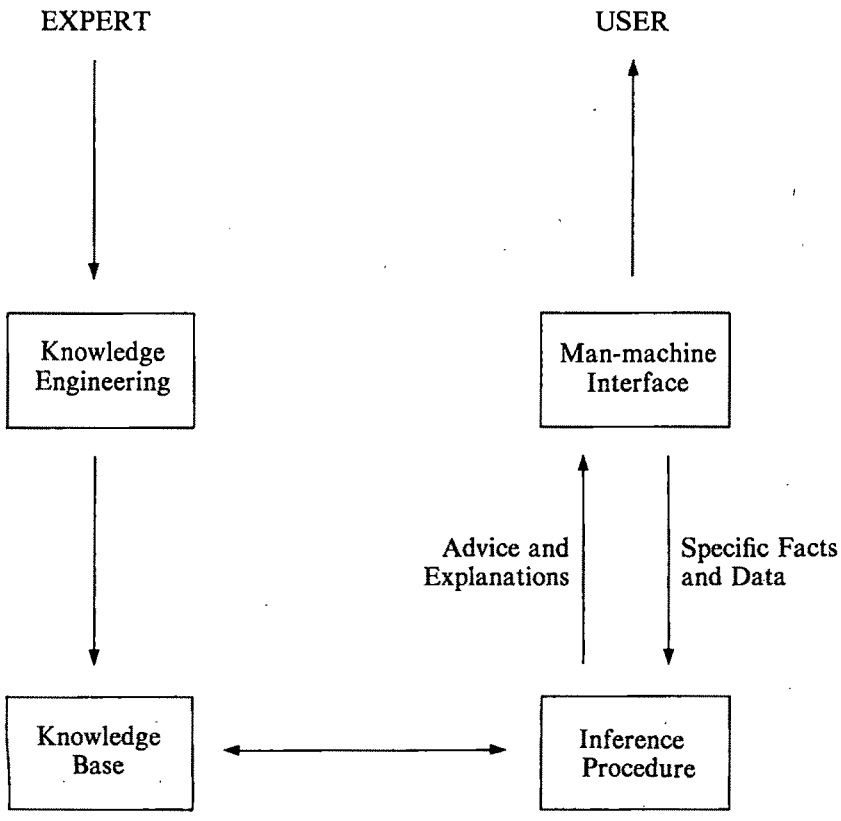


FIGURE 1. *Anatomy of an Expert System (after Fiegenbaum)*

that represent examples of good practice and good judgement in the application or interpretation of those facts (these may be called processes). For example, if X and Y and Z is the case, then a conclusion Q may be deduced with probability P. An expert system has to have both types of knowledge in its knowledge base, which is thus far more than a mere database, and includes opinion, belief, and rules of thumb.

Acquiring, and codifying, the necessary heuristic knowledge is perhaps the hardest task in designing an expert system, and a new breed of *knowledge engineers* are undertaking painstaking study and questioning of human experts in order to draw out those intuitive leaps and imaginitive insights that are the hallmark of the true expert, and convert these into reasoning, but not necessarily self-consistent, programs. This role is one that information scientists might well consider as falling into their territory, since it is a special form of information acquisition and information classification.

To apply this knowledge, the expert system also contains a set of *inference procedures*, which usually comprise simple logical rules and problem-solving methods that can be brought to bear to relate the data representing the situation under investigation to the stored knowledge base. For example, a common line of reasoning is *backward chaining*, working from the desired goal to what data and knowledge you currently have.

There are three essential issues on which much more work has to be done before expert systems can become commonplace. There is the question of how knowledge shall be best represented through both a data structure and a set of logical structures in computer memory, so that these may be conveniently accessed for problem-solving. Management of the knowledge base in terms of its organisation, control, extension and updating needs to be an automatic feature of no concern to the end-user. Likewise, the design of the inference engine should be such that it is virtually independent of the subject domain, and can thus be regarded as a universal problem-solver. Several kernel systems have been evolved which contain such essential elements for knowledge-based management and inference procedures, of which the best known is EMYCIN derived from the early successful expert system MYCIN designed to diagnose blood infections.

Most important is the task of acquiring the necessary knowledge in the first place in a manner that improves the transfer of human expertise into the symbolic structures suitable for storage in a machine. Programs that improve their performance by experience (as in many chess-playing programs) provide a clue here, but automatic extraction of heuristics from human heads is still a far-off goal. Current practice involves extensive discussion between knowledge engineer and subject experts, followed by iterative refinement of the resulting program by analysis of test cases.

Expert systems are already operational and widely under development in many areas (see Figure 2). Among advantages that have been claimed are that they represent 'real-life' situations more closely than do conventional computer programs, since they combine rule-of-thumb techniques

Application Areas	*Expert System*	
Computer systems	DART	Diagnosing computer faults
	R1	Configuring computer systems
Education and Training	GUIDON	Intelligent CAI system
	SOPHIE	Teaches electronic trouble-shooting
Engineering	EURISCO	Designing microelectronic circuits
	SCCES	Calculating stress corrosion
	SACON	Structural engineering design
Geophysics	PROSPECTOR	Evaluation of mineral deposits
	WAVES	Seismic data analysis
Knowledge engineering	AGE	Development of expert systems
	EMYCIN	Basic inference system
	SAGE	Basic inference system
Law	TAXMAN	Tax avoidance arrangements
Medicine	MYCIN	Diagnosis of blood infections
	ONCOCIN	Cancer chemotherapy management
	PUFF	Identification of lung disorders
Science	DENDRAL	Molecular structure determination
	GENESIS	Genetic engineering planning

FIGURE 2. *Sample Expert Systems*

with well-formulated quantitative techniques. The simple form of reasoning performed by most types of expert system is usually at a level that can be readily understood by a lay user unsympathetic to the complex detail of conventional computer programming. The ability of the system to explain its reasoning process allows the user to develop trust in its responses; and the familiar language in which the knowledge base is expressed makes the system more amenable to practitioners with little computing experience. Lastly, probability and uncertainty can be handled through fuzzy logic and other techniques, particularly in areas where there is incomplete knowledge and where judgement is paramount.

Expert systems appear to offer, therefore, a more human approach to computing. Returning to the possibility of using such systems in a consultancy role, how may this be envisaged? Considering the factors enumerated at the beginning of this paper, expert systems have the potential to be as effective as the better consultants, and more effective than most. There is,

in fact, a spectrum of uses to which expert systems may contribute, ranging through:

- improving the accuracy and efficiency of existing experts;
- making additional skills available to professionals;
- teaching expert skills to aspiring professionals;
- making Everyman his (or her) own expert.

It is unlikely that expert systems will ever completely displace human specialists, since as expert systems become more 'expert' the human consultant may devote his attention to less trivial problems, or become concerned with the effect of less well-documented factors. Neither is there the prospect that expert systems will offer the general public the opportunity of diagnosing their own diseases and prescribing appropriate treatment, but they may well offer advice on the appropriate level of rent rebate, on elementary car maintenance, or on the finer points of home wine-making. The prospect of the 'Intelligent Librarian' is, perhaps, one of the more plausible, offering an active dialogue with the erstwhile browser, searching the card index automatically (and perceptively) for relevant items, indicating related topics and further worthwhile references, connecting the inquirer with distant databases and ordering photocopies from loan collections, and generally relieving harassed reference librarians and information officers of the thousand-and-one routine requests that currently plague their working lives.

To recapitulate, the potential benefits of expert systems include:

- improved reliability over human endeavour, especially in situations in which stress or urgency is involved;
- improved consistency in situations where uncertainty in observation, paucity of data, or questions of probability are primary factors;
- improved speed of response allowing greater accessibility, or the opportunity to institute alternative inquiries;
- wider distribution of expertise, leading to dissemination of real experience as against academic theory;
- constantly self-improving systems that highlight weaknesses in current understanding.

There is one other potential that may attract those with aspirations to immortality and a desire to leave behind a living record of achievement. What if we had been able to capture in an expert system the reasoning powers of Einstein, or Newton, or Galileo, or Leonardo da Vinci?

Fifteen years' development has now brought the expert system from the experimental laboratory to the point at which it may be seriously used for crucial operational decision-making. The days of the human consultant are not yet, however, numbered, nor yet are there prospects of widespread calamities engineered by countless 'sorcerer's apprentices' pounding their home micros. But serious attention, surely, has to be given to the professional use of expert systems by professional consultants to increase their productivity and improve their own information management practices.

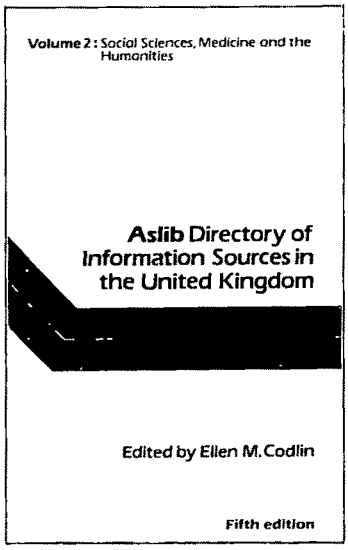
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The management of online legal information

Bernard Houghton

Senior Lecturer in Information Work, Liverpool School of Librarianship and Information Studies

Paper presented at the 57th Aslib Conference, 'Information Management: Potential and Practice', University of East Anglia, Norwich, England, 18–21 September 1984.

This paper seeks to identify the three major factors in the online legal information spectrum – categories of database; groups of information users; types of information need – then to examine their interrelationship and draw some conclusions as to how the information needs of users can be most effectively met.

Online databases

Legal databases can be classified into four groups:

(A) Statutory, regulatory and case-law bases containing primary legal information

These are full-text databases holding the complete text of statutes, statutory instruments and law reports. The two primary legal systems which have been available in the United Kingdom since 1980 are LEXIS marketed by Butterworth (Telepublishing) Ltd and EUROLEX by the European Law Centre Ltd. Both are interactive online systems enabling the user to search on the full text of each document entered into the system. The major difference between the systems is that LEXIS requires the subscriber to acquire a dedicated terminal which has specific LEXIS function keys peculiar to that system. EUROLEX is accessible via any online terminal with dial-up access via British Telecom's PSS (Packet Switchstream Service) network or alternatively by dialling directly into the EUROLEX host. Other systems are available via Prestel e.g. LAWTEL and INFOLEX which employ menu-driven bases giving the user access to titles/abstracts of recent reports and journal articles.

(B) Legal bibliographic databases which index and abstract papers and articles from specifically legal journals, monographs and government reports

Two exclusively legal databases accessible via Dialog Information Services are LEGAL RESOURCES INDEX (LRI), which covers 600 law journals, newspapers and in addition, government reports and monographs from the

Aslib Proceedings, 37 (3), March 1985, p.165–170. Printed in Great Britain.

Congress MARC database from 1980 onwards, and the NCJRS file (National Criminal Justice Reference Service, the national and international clearing house of practical and theoretical information on criminal justice and law enforcement established by the US Department of Justice. The file runs from 1972 to the present and is updated with 1,000 records per month totalling 75,000 citations. LRI is updated each month with approximately 3,000 records.

(C) Social sciences bibliographic databases which contain a large percentage of legal information

Examples include ABI/INFORM – business law (DIALOG, ORBIT); MANAGEMENT CONTENTS – finance, banking, public administration, industrial relations, etc. (DIALOG, ORBIT); PAIS INTERNATIONAL – public administration, public policy, legislation, court decisions, etc. (DIALOG); SOCIAL SCISEARCH – criminology, penology, law, etc. (DIALOG); PHILOSOPHER'S INDEX – philosophy of law, (DIALOG); FEDERAL INDEX, FEDERAL REGISTER ABSTRACTS – information on federal government activities, hearings, speeches, bills, rules and legislation and other Congressional activities, (DIALOG, ORBIT); SOCIOLOGICAL ABSTRACTS – sociology of law, penology, etc. (DIALOG). A search on PAIS on the law relating to gun control yielded twelve citations. (See Figure 1.)

The subject of legislation and aircraft hijacking yielded two citations on SOCIAL SCISEARCH. (See Figure 2.)

On ABI/INFORM a search relating to the law of employment, utilising the following strategy realised 2,334 papers. (See Figure 3.) Obviously this search would be further limited by adding more restrictive search parameters but nevertheless the amount of material in the bases is impressive.

(D) Databases covering specific disciplines which will provide a wealth of legal documentation in the fields which they cover

Examples all available on DIALOG and ORBIT where needed are: DISSERTATION ABSTRACTS – all US doctoral theses since 1851, (ORBIT); CONFERENCE PAPERS INDEX (ORBIT); ECONOMIC ABSTRACTS INTERNATIONAL, ENVIROLINE, ENVIRONMENTAL BIBLIOGRAPHY, POLLUTION ABSTRACTS, ENERGYLINE (ORBIT); CHEMICAL ABSTRACTS (ORBIT); COMPENDEX – engineering index (ORBIT); FOOD SCIENCE AND TECHNOLOGY ABSTRACTS. As will be discussed later the wealth of legal information in databases in categories B, C, and D is largely lost to members of the legal profession.[1]

Set Number	citations	
1	5161	LAW?
2	5767	LEGISLAT?
3	12	GUN(W)CONTROL
4	51	FIREARMS
5	12	(1 OR 2) AND (3 OR 4)

FIGURE 1. *PAIS search*

1	25101	LAW?
2	2747	LEGISLAT?
3	431	AIRCRAFT
4	31	HIJACK?
5	2	(1 OR 2) AND 3 AND 4

Economic study of U.S. aircraft hijacking, 1961–1976. Landes, WM Journal of Law and Economics, V.21, N.1, p.1–31, 1978

Criminal jurisdiction over aircraft hijacking. Feller, SZ. Israel Law Review, V.7, N.2, p.207–213, 1972

FIGURE 2. *SOCIAL SCISEARCH search.*

1	1400	LAW?
2	7320	LEGISLAT?
3	4451	LEGAL
4	9514	EMPLOYMENT
5	1847	ffCCUPATION?
6	2334	(1 OR 2 OR 3) AND (4 OR 5)

FIGURE 3. *ABI/INFORM search.*

Legal information needs

Legal information needs may be grouped into the following categories (after each category is indicated the class of online database in which this type of information is likely to be found) – requests for information on:

(1) obtaining an overview of a subject so that a legal problem might be more clearly identified; (B,C,D)
(2) specific statutes or regulations; (A)
(3) the case law surrounding a particular area; (A)
(4) obtaining a pointer to primary authority; (A,B)
(5) strengthening a minority position where no precedent exists; (A,B)

(6) preparing a brief; (A,B)
(7) identifying the subsequent citations of a decision; (A)
(8) monitoring a judge's decisions and rulings; (A)
(9) identifying the appearances of a particular counsel; (A)
(10) monitoring sentencing policies and practices; (A)
(11) monitoring compensation policies in civil law; (A)
(12) obtaining a current awareness service on the significance of recent law; (B,C,D)

User groups

(a) The legal profession. Lawyers have traditionally undertaken their own sources. Most large law practices will maintain libraries usually staffed by a 'librarian' who will in most cases merely act as a custodian or curator – it will be the lawyer or his articled clerk who will carry out the actual searching. Many of these larger practices will now be accessing the two primary legal databases online as the range of the work that they undertake requires efficient and up-to-date information sources. Both LEXIS and EUROLEX have developed 'user-friendly' systems to respond to the profession's own searching requirements. They are then well served by the primary systems. But lawyers in the UK are largely unaware of the vast amount of information which would be of potential use to them in database categories B, C, and D. Very few practices will be users of DIALOG or ORBIT and it is through these systems that the databases are available. These systems are in general use in academic and public libraries in the UK but again their vast potential is lost to the legal profession whose experience of online access is severely limited to primary legal bases.

Many smaller practices in the UK are, however, not even using the primary law databases. They claim that their 'bread and butter' work, mostly relating to domestic, property and petty criminal law, does not demand such sophisticated back-up services – again the justification is 'we know our sources'. But on occasions these practices too will be in need of legal information when they are drawn outside of their normal range of work. The information they need will ultimately become available but the delays involved in obtaining it will be costly. Again there is an information 'vacuum', albeit a temporary one. But in this area knowledge of the secondary legal sources outside of the journals which are regularly purchased and scanned is almost total.

(b) Academic use. Virtually every law school in the UK's universities and polytechnics is now using primary legal databases, initially for the academic staff's research and consultancy needs but latterly also for teaching purposes. In addition, the libraries in their parent institutions will be users of DIALOG and ORBIT thus having access to bibliographical legal databases. Thus students in these institutions are increasingly being exposed to the advantages of online access. EUROLEX also has a training file which can be accessed by subscribers at no cost and also a simulation package which can be loaded into any mainframe to allow the trainee

searcher to absorb the command language and develop search strategies in a 'non-stressful' climate. As more of the schools introduce properly structured awareness courses on the potential of online access into their curricula there will inevitably emerge a corpus of young lawyers who will demand access to online information systems when they begin to practise.

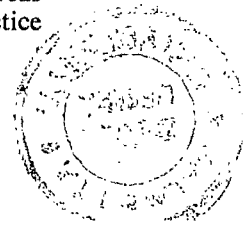
(c) Organisations and individuals outside the above categories who have occasional demands for legal information: law centres, citizens advice bureaux, trade unions, media (local radio, newspapers, etc.), individual members of the public. Periodically these individuals may need legal information, perhaps prior to consulting a lawyer. Their information needs will fall largely into category (1) identified earlier 'obtaining an overview of a subject so that a legal problem might be more clearly identified' and thus the need may be answered by databases in either category (A) or (B). For many of these individuals it will be difficult to identify a source of information which they may turn to.

Thus it is now possible to identify the overall nature of the legal information problem:

(i) lawyers in large practices are largely unaware of the potential of the information contained in secondary legal databases;
(ii) the smaller practices are not aware of the potential of either primary or secondary online sources;
(iii) academic institutions are only aware of the secondary sources if their parent institutions have an outgoing, proselytising library and information service;
(iv) groups and individuals outside the professional and academic sectors are almost completely unaware of the existence of legal information sources.

As the teaching of information sources is introduced into the law schools' curricula the information problem inside the profession will diminish but there is a need for an interim solution to this information vacuum and also for an ongoing service to cater for the needs of groups (ii) and (iv).

This solution could be in the establishment of more mid-user services now being developed by some public libraries, e.g. Sheffield, Nottingham, Hampshire, Cheshire, etc, and a smaller number of academic institutions, e.g. Leicester Polytechnic, with the active support of one of the primary database suppliers, EUROLEX. There are now about twenty such centres throughout the UK. In these environments the institutions will undertake to run searches for third parties for a fee which will cover database costs. The interpretation of the material retrieved from the search will, obviously, be the sole responsibility of the third party who is always encouraged to be present when the searching is being carried out. These centres will also invariably be users of DIALOG and ORBIT and thus can perform searches on the secondary bibliographical databases noted in categories (B), (C) and (D). Yet another type of mid-user service is available in some areas for the EUROLEX libraries whereby an existing user in a legal practice



is 'licensed' to carry out searches on his own terminal for up to five other legal practices. This is seen by EUROLEX as 'pump-priming' exercise in that the third party users will ultimately become EUROLEX subscribers themselves. Again the interpretation of the material retrieved from the system is the responsibility of the third party. LEXIS is also experimenting with the Law Society, 113 Chancery Lane, London, in making available to any member of the society on application to the library a search service using the LEXIS system. This service also extends to the EUROLEX libraries and the Prestel viewdata-based LAWTEL and INFOLEX. Some problems with the service are however foreseen by LEXIS who maintains that liability problems could arise where the searcher may fail to retrieve a reference from the database which is subsequently found to be relevant to the subject of the legal search. This it believes could inhibit the development of the service. Another more obvious inhibitory factor in the growth of mid-user centres for the institutions and individuals in group (iv) is the high cost of using primary legal databases. Whereas the larger legal practices can well afford database charges running at £2 per minute and whereas the academic sector receives an 'educational' rate which it is obviously in the interests of the suppliers to give, the individual users of mid-user centres are required to pay the full commercial rate. If use of the primary systems is to increase in this area the suppliers must be persuaded to reduce their online charges for what is not only an important information, but also a significant social, need.

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Edited by STEPHEN A. ROBERTS

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Online use of external databases in Australian manufacturing industry

Carmel Maguire and Robin Kench

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Online use of external databases by Australian manufacturing companies has been growing rapidly since 1979. A survey of online users in some chemical and food companies found that in one-third of the companies scientists and technologists performed searches. They did not search as many databases as the librarians in the other companies. They are, however, obtaining more information than before. All companies considered online searching cost effective, citing the rapid retrieval of information and the fact that searches need only be conducted when information is wanted, as evidence of cost-effectiveness. Implications for manufacturing industry in Australia of current trends in the online industry are discussed and the potential of the new technology for equalising access to information among companies of all sizes is noted.

Introduction

In the past decade much has been written in library and information science journals about online searching, new journals devoted to online topics have been launched and online meetings have become regular events in the northern hemisphere. Developments in Australia, physically remote from the main centres of activity and possessing a smaller market, have come later.

The cost of long-distance telephone calls from Australia did not encourage the early use of overseas online databases. It was not till the introduction in April 1979 by the Overseas Telecommunications Commission of the Multimode International Data Acquisition Service (MIDAS), which uses packet-switching technology, that costs were cut dramatically and the use of overseas databases began to grow rapidly. The Information Science Section of the Library Association of Australia plans to hold the First Australian Online Information Conference in Sydney on 20 – 22 January 1986.

Surveys of the use of online information retrieval services in Australian academic libraries have been undertaken[1]. Little has been known, however, of the use made by manufacturing industry of these services, except by the commercial online hosts who treat as very confidential their data on traffic and users.

In 1983 the authors conducted a survey of manufacturing companies in New South Wales operating in the food and chemical industries and

having some R&D capacity, to investigate the access of these companies to information about new technology. Overall results have been reported by Maguire[2]. Some of the 60 companies responding spontaneously mentioned the use of computerised databases as sources of information on new technology, and the authors decided to investigate this aspect further.

The survey

A brief survey form was mailed to all 60 companies focusing on the use of databases. This was followed up by phone interviews and personal visits with companies using databases. The response rate from companies to the database questions was very pleasing with 57 replying, 28 from the food industry and 29 from chemical companies. Altogether 18 of these 57 companies, that is about a third, reported that someone in the company used external databases. Another 5 companies indicated infrequent use through other organisations, such as universities, the CSIRO (Commonwealth Scientific and Industrial Research Organisation), and an international industry association, and another 8 reported plans to use external databases. That is, five years after the introduction of MIDAS approximately half the companies in this survey obtain information or plan to obtain information online from external databases.

The 18 companies which reported direct use of online external databases came down to 14 when mergers, common information services, and so on, were taken into account. The authors analysed responses from these 14 companies, 9 of which were in the food industry and 5 in the chemical industry.

Information services and database searches

In 5 companies, 4 in the food industry and one chemical company, scientists and technologists introduced online searching to the company and they carry out searches on terminals located at their workplace, in the laboratory or nearby office. These 5 companies are quite large by Australian standards, with total employees ranging from 500 to 1,500. But none has full-time qualified library or information services staff. Most have collections of material referred to as 'the library', but three have no library staff at all, one has a part-time librarian and one an unqualified person in the library.

In the other 9 companies using external online databases, searches are performed by library and information service staff, mostly for R&D and technical staff. Differences in online searching according to who searches are readily apparent. In the 5 companies where scientists and technologists search, 3 search only on Dialog, and the other 2 search on Dialog and Orbit. These systems have representatives in Australia, namely Insearch/Dialog and SDC/Orbit, who maintain help-desk facilities and who offer regular training courses in Sydney and in other capital cities. Companies using library staff to search reported use of more online systems, the median for this group being 5 and one company used as many as 11 online systems to access databases. Online systems used are listed in Table 1.

TABLE 1. *Online systems used by manufacturing companies in the food and chemical industries.*

	Food (N=9)	Chemical (N=5)
Dialog	9	5
Orbit	7	3
Pergamon-Infoline	3	3
Ausinet	3	1
I.P. Sharp	3	1
Australian Medline Network	3	—
ABN	1	1

Plus 7 others used by only one company.

It is not surprising to find that in companies where information specialists do the searches, many more databases are used than in companies where scientists and technologists search. It has been argued that the advantages of an information scientist or librarian as search intermediary are a knowledge of the structure, content and coverage of databases, and the ability to access a range of online systems and to have in-depth knowledge of each system[3]. It has also been suggested that at least 5 to 10 searches per month are necessary to maintain proficiency at online searching[4]. The librarian serving a group is more likely to become proficient at searching a wide range of databases than an individual technologist searching less frequently.

While the scientists and technologists who do their own searching in five of the companies may not search frequently enough to become proficient on particular databases or search enough database systems to cover the range of relevant databases available, they are obtaining more information than they did prior to the introduction of online searching to the company.

The problem of distance

Not only are these companies acquiring more information than previously, but they are obtaining it more rapidly. This is particularly important for Australian companies used to long delays in the arrival of technical information.

Some delays still exist in document delivery. Companies with libraries tend to use the inter-library loan network in Australia. Requests are sometimes directed to other special libraries in the food and chemical industries, but the libraries mentioned as most heavily used are the CSIRO libraries and the library of the University of New South Wales. Delays of four weeks are common in the inter-library loan system. One large library

reported that it orders documents from the British Library Lending Division and usually receives the article requested in ten days. Technologists in the companies lacking library services sometimes visit nearby libraries if they know a particular journal is held, or they use the online document-ordering services of Dialog and Orbit. Documents ordered are usually received within two weeks and in most cases technologists do not find this delay a problem.

Problems of distance and late arrival of documents may be overcome in part with developments in the online industry such as the predicted increase in the number of full-text databases. The impact of full-text database services has not yet been felt in Australia.

Perceived cost-effectiveness of online searching

The overwhelming response from these industrial users when asked whether online searching was cost-effective was 'definitely'. Most users related it to the speed with which a database search can be conducted, for example, 'it's so fast' and 'it's cost-effective in terms of time saved'. Markee has found that 'Rapid retrieval of information is what makes online bibliographic retrieval cost effective for most users'[5].

A technologist in a company without a library related cost-effectiveness to the cost of the individual search, with the remark, 'for $40 it's got to be'. Flynn *et al.* concluded, following a comparison of the cost-effectiveness of online and manual information retrieval at ICI (UK), that

> 'One important feature of online searching is that the organisation with the search questions only requires a telephone, modem or acoustic coupler to connect the telephone to the communications system, and a terminal. The financial investment is low considering the returns and is not beyond the means of small organisations with limited budgets'[6].

Ongoing costs depend on usage. As one of our responding companies replied, 'it's cost-effective, as you only use it when you need it'.

Implications of trends in the online industry

A current trend in the online industry is the growth in the number of databases and online systems. Haygarth Jackson notes 'It is easier to learn to search and become adept at searching a very limited range of databases rather than a wide range of databases in case of need'[7]. Exacerbating the difficulties for end-users is the trend towards exclusivity of databases. For example, PIRA, produced by the Research Association for the Paper and Board, Printing and Packaging Industries, and RAPRA, produced by the Rubber and Plastics Research Association, are now available only through Pergamon-InfoLine. This trend creates difficulties for technologists in small companies who are end-users, by increasing the number of command languages and search strategies with which they need to be familiar to conduct a comprehensive search.

An industrial trend which may, however, assist the end-user in the small company is the development of software packages for the interface between microcomputers and databases. Levine reports that at the National Online Meeting 1984, at least six products focused on microcomputer packages which assisted the end-user in searching[8]. Papers on the use of the microcomputer for online searching have already appeared in the literature[9]. This type of software package is not yet in use in the Australian companies surveyed, but the rapid growth in the number of microcomputers in Australian manufacturing industry could set the scene for its introduction.

Another industrial trend is the increasing number of databases containing numerical data and chemical and physical properties. In contrast to bibliographic databases, the numeric and chemical structure databases 'operate on a level closer to the activity of those who actually use the data'[10]. Use of numeric and chemical structure databases was not evident in the manufacturing companies surveyed. Four companies were registered as users of I.P. Sharp's numeric databases, but respondents were vague about any searches conducted. This lends support to Collier's finding in his 1981 survey of European online users 'that users of bibliographic files tend not to stray outside their limited field'[11]. Attempts to bypass the search intermediary and go direct to the specialist end-user are being made by online system operators and producers of numeric and chemical structure databases.

The trend towards direct access by the end-user may have economic implications for the online industry. Responses to the survey indicate that for scientific and technical staff searches are conducted when there is a problem or when a new project is started. Information activities which have in the past been viewed as an overhead expense of the company have been vulnerable to cost cutting in times of economic recession. Records of search requests kept by the library of one of the large companies in our survey indicate that database searches are no exception. This library charges direct costs of online services to the end-user who pays for them from his project or department budget. When in 1982 Australia felt the effects of the economic recession, the number of online search requests in this company fell by 6 per cent from the 1981 figure, interrupting a pattern of fairly rapid annual growth for the previous three years. This was explained by the nature of the demand for searches, there being fewer new projects started. While it would be unwise to generalise from this case, it does not support the optimistic view of Dunn and Boyle of Chemical Abstracts Service that 'More organizations now appear to be charging online services as direct project costs, which might enchance the possibility of the services surviving cuts during "hard times" '[12]. When the end-user accessing databases directly has no new projects and existing ones are cut, database searching will drop off. Only one company in the survey, a chemical company with a well-established library and information service, had set up selective dissemination of information services (SDIs) for laboratory staff, who receive monthly print-outs which are updates of

material added to databases in their selected fields of interest.

The current trend is one of continued growth in use of online databases. In Australia this growth is coming mostly from an increase in the number of companies introducing online searching. Interestingly, spread of the use of external databases among these manufacturing companies owes much to personal contact, technologists hearing about it from colleagues in other companies. Eight companies in this survey are planning to use databases. Four of these have fewer than 110 employees, and though all eight subscribe to journals, most lack librarians and formal information services. The concept of purchasing information when it is needed from an online database seems to have more appeal to managers in small companies than the longer-term approach of establishing a library or information service to meet continuing and future information needs.

Conclusions

The survey of online database usage by Australian manufacturing companies in the food and chemical companies, five years after the introduction of MIDAS, indicates growth in use of online services. The rapid retrieval of information by online searching is particularly significant in a country distant from the major information-producing centres. Also significant is the capability it offers to technologists in small manufacturing companies in Australia, which lack librarians and information services, to access information when they need it. In the past large companies have had a distinct advantage in accessing information, but the new technology has potentially equalising aspects for companies of all sizes. As a technical director of a large chemical company put it, access to external databases has a democratising effect. This could be beneficial for manufacturing industry in Australia.

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Costing and the economics of library and information services

Edited by STEPHEN A. ROBERTS

In the light of dwindling resources and increasing user needs, today's library and information service managers need more help than ever in making informed and effective decisions about economic planning and budgeting; an understanding of costing concepts and techniques is essential for those managers who wish to ensure the efficiency and productivity of their services. This volume aims to provide the hard-pressed manager with a balanced selection of readings on the costing of library and information services.

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Change in library and information services: some thoughts on the Portuguese scene

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Introduction

Change is a somewhat mysterious process which has aroused the academic interest of sociologists, psychologists, political scientists, and specialists from other fields. Information scientists should also be concerned with this topic, given that change seems to be the most permanent feature in this new discipline. Typical research questions such as what is change or how does change come about can be approached from many standpoints, ranging from the concepts derived from sociological and psychological theory to the very practical description of change taking place day by day.

Organisational change, which is sometimes identified with organisation development or with management of innovation, may not seem at first an important issue in library and information units. Many will say that what libraries need, especially in the less developed countries, are adequate stocks, well-trained staff, and suitable premises and equipment, not organisational studies. While this is very true in the majority of cases, organisational problems do not bear a direct relationship to the scarcity of resources and are often generated by such a scarcity.

The advent of information technology (IT) and the excitement it has aroused amongst library and information people is a new focus of interest in the professional literature. In countries where library and information services have not reached a point of significant development, IT is looked upon as a possible answer to many enduring problems but while it is theoretically feasible and desirable for IT to be introduced in such countries, organisational blockages often prevent it (see for example Baark[1]). The question of IT in the Third World is by no means a settled issue but all the evidence shows that the dynamics of development are pushing new technologies into libraries and information units and eventually the need for change will surface in full force.

The distinction between developed and developing nations has been widely debated in many spheres and in the library and information field there have also been important contributions such as the one by Lemos[2] which focuses mainly on the situation in South American countries. If in other fields the distinction is not easy and is often very arguable when it comes to information, the world seems to be clearly divided, as it was in the 15th Century with the Treaty of Tordesillas. This time it is not a

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matter of the possession of land and seas but of information. The division is between the countries which have access to information and those which do not. In this light and also taking into account the state of under-development of libraries and information in Portugal, it can be said without arousing much controversy that Portugal ranks with many of the so-called developing countries. Of course there are many and very significant differences, among which the eight-century-old culture which should not be underestimated. But then, there are countries with even older cultures which have been labelled as 'developing' for purposes of foreign aid, etc.

In Portugal libraries are by no means new. They have existed for many years and they have created their own traditions. Inevitably, the library profession also developed its own style, attitudes, values and *modus faciendi*. All of a sudden, in the third quarter of the 20th Century, the information revolution is upon us, computers threaten to come into the libraries, the younger generation of professionals press for change, users begin to wake up to this new product called information and they want it readily available. The need for change is clear and is perceived by most professionals aware of modern trends and developments in the more developed countries, but the million dollar question is, *How*? Undoubtedly, change should also be a concern of the government or of the parent body to which the library is responsible, but then, will that be sufficient? Organisations do not change simply by introducing new legislation or fresh resources, although those are important ingredients, especially in countries where the classical bureaucratic model of organisation prevails.

In the present paper, the issue of change will be dealt with from two different perspectives:

1. An intra-organisational perspective.
Change within library and information organisations, using as a basis the management and organisation literature on the specific topic of change. Organisation theory will be used to underpin a discussion on the problems likely to be encountered when change is contemplated in an organisational environment predominantly bureaucratic, such as the one to be found in Portugal as in the majority of Latin countries.

2. An environmental perspective.
Change as a factor of environmental forces, such as the professional ethos in the country, the work of library and information consultants and the role of the most influential international organisations in library and information matters, i.e. Unesco.

The data and facts presented are derived from personal knowledge of the Portuguese library and information scene, not only as a practitioner but as a managing member of the country's professional association. Library and information work will be treated as a single entity simply because the problems are still very similar. Some of the material used in this paper was taken from an academic assignment presented to the Leeds School of Librarianship as part of a Master's programme of study.

The change process in organisation theory

In 1967, Nicos Mouzelis[3] pointed out that 'one of the reasons for the neglect of the organisation's larger environment is the ethnocentric character of present theory (empirical research being mainly restricted to the study of American and English organisations)'. Today, the situation has not changed much. Organisation development (OD) which is a set of techniques and management strategies derived from Organisation Theory and from the practice of Management, was developed in an organisational culture which is traditionally open, liberal and with a preference for fairly loose organisational structures. Hence, in Anglo-Saxon countries these techniques are welcome and they achieve positive results. But what happens in Latin countries? Unfortunately, little has been written on the cultural dimension of OD and it is only recently that this subject has begun to surface, mainly due to the problems encountered by multinational companies operating in a cross-cultural environment.

The first problem that has to be faced when starting to study OD is to try to pin down what is meant by the term. Lumsdom[4] says that 'OD suggests several meanings – some explicit, some implicit. This confusion has resulted in OD being used literally to describe a strategy for combining all various approaches to organisational improvement in one grand package, and also to describe a technique based on interpersonal or interactive skill improvement'. Friedlander and Brown[5] see the objectives of OD as 'those optimizing human and social improvements or as those optimizing task accomplishment or more likely as some (often confused) blend of the two'. McLean[6], in an extensive review of the field of organisational change and development, comes up with the following definition of OD: 'an emerging professional body of theory and practice concerned with applying behavioural science knowledge and techniques to the resolution of human problems and the exploitation of opportunities associated with change in organisations'.

The above three definitions or explanatory statements about OD, although apparently different, all share one common factor: they all agree that a set of techniques can be put together to bring about improvement in organisations. McLean expresses the view that while OD techniques have been developed at a fast pace, the theoretical framework to bind them together and give support to a set of guidelines on how to manage change, has lagged behind. He argues that important questions about change remain to be answered, as for example:

- What do we mean by change and order in organisations?
- How does change occur naturally?
- What causes techniques to be effective in some circumstances and unproductive in others?

These are very relevant questions, especially if the issue of organisational change is raised in a country with a different organisational culture from the Anglo-Saxon one, where most of the OD literature comes from. For example, what does the question 'How does change occur naturally?' mean

in a country where the prevailing organisational design is based on the bureaucratic model? In a bureaucracy, with rigid norms and regulations and a lot of resistance to change, to what extent can we talk of change occurring naturally?

The present author has carried out a short review of the literature on OD[7] with special emphasis on the cultural dimension of Organisation Theory, where the keynote is one of scepticism and reserve about the application of Anglo-Saxon inspired OD techniques in Latin countries. Hofstede[8], using research data from what was probably the largest ever cross-cultural research project into work-related values, agrees that 'American-style organization development meets, for example with formidable obstacles in Latin European countries. [...] Latin countries lack the equality ethos which is an important motor behind OD. Latins believe less in the possibility of self-development of people.' The issue of culture is only now emerging among students of organisation and much more needs to be done, as Professor John Child[9] points out: 'Cross-national enquiry into organization and management is a particularly arduous field of investigation but the question remains whether we can afford to ignore it in our increasingly inter-dependent and international world'.

Organisational characteristics of library and information services in Portugal

About 10 per cent of the Portuguese working population consists of civil servants. In Portugal, the education system, the health and social security systems, public works, transport and communications and most of the essential services provided by the State are centralised in Lisbon. Organisational and staff structures, rules, procedures and salary scales for all these departments are laid down centrally and this obviously creates a predisposition for organisational uniformity throughout the country, not only in the civil service and state-owned enterprises, but also in private companies. Libraries do not escape the rule and they all tend to show very similar organisational characteristics, especially those which depend in one way or another on the ruling of central government.

Very broadly speaking, Portuguese library and information services (LIS) can be characterised by three main features: lack of co-ordination, poor co-operation and isolation of the professionals. These features bear a direct relationship to the so-called disfunctions of the bureaucratic model, under which these libraries have developed over the years. They will be discussed in turn, but before doing so it will be useful to highlight here the four basic characteristics of a bureaucracy, as they were described by Crozier[10].

1. The impersonal rules. Impersonal rules delimit, in great detail, all the functions of every individual with the organisation. They prescribe the behaviour to be followed in all possible events. Every member of the organisation is protected both from his/her

superiors and from his/her subordinates. Each is, on the other hand, totally deprived of initiative and completely controlled by rules imposed from the outside.

2. The centralisation of decisions. In order to keep strictly to the climate of impersonality it is essential that all decisions be made at a level where those who make them are protected against personal pressures from those who are affected by them. Centralisation is thus the second means of eliminating discretionary power within an organisation, but the price the organisation has to pay for it is still greater rigidity.

3. The isolation of the different strata and the concomitant group pressure on the individual. The isolation of the strata, imposed by the rules, is associated with a pressure of the peer group, as this is the only force that stands between the individual and the organisation. This pressure of the peer group is important for understanding the bureaucrats' 'esprit de corps', ritualism and the displacement of goals, which is a result of the isolation of each stratum and the control it gains over its own domain.

4. The development of parallel power relationships. Parallel relationships can develop within the hierarchical line, but in a typical bureaucracy they will develop outside it. This results from the complete reorganisation of the informal network of human relations and gives rise to new powerful groups within the organisation.

The first feature of Portuguese LIS identified above – lack of co-ordination – is a direct result of some of these basic characteristics of bureaucracies. That is, communication which is fundamental for co-ordination to exist is made impossible by the impersonality of relationships on the one hand and by a remarkable lack of confidence on the part of librarians to exchange views on professional matters, on the other hand. Poor co-ordination is an endemic problem not only in Portugal but in many developing countries[2]. Libraries were established individually over the years, and there was never any concern for the establishment of formal or informal communication links for the rationalisation of resources. As a result, the situation at the moment is one where each library is left entirely on its own, without the help or advice from any central policy-making and co-ordinating body. Ultimate decisions or major changes rest solely on the parent body, which may be a ministry, a university or an industrial company. It was only five years ago that the National Library in Portugal was empowered with a normative role, especially regarding technical matters, but due to lack of qualified staff and inadequate financial resources nothing has yet come out of this attempt to introduce some co-ordination into the country's LIS.

The second characteristic – poor co-operation – also owes a lot to the bureaucratic system, but that is certainly not the only culprit. Lack of resources has been a chronic problem in Portuguese LIS and, again, this seems to be a common feature in developing countries, as Lemos quoting Parker, points out:

> 'Library collections are often inadequate to meet the needs of users and even when they are adequate, are often underused. Lack of qualified staff prevents the proper development, either of document collections or of user education programmes and even when this is not a problem, libraries often have to struggle with inadequate finance, cumbersome organisational structures and a lack of basic legislative support. A lack of resources, far from encouraging sharing, often produces the opposite effect. Librarians cannot share what they do not have and may well feel that, if too little is shared between too many, everyone will end up with less than they had to begin with.'

Lastly, the third feature of Portuguese LIS mentioned above – isolation of the professionals – is tied to the professional attitude of the country's library and information people. Running the risk of oversimplifying the issue, I would characterise this professional attitude as inward-looking, timid and sometimes not very creative. This is of course, the long-term consequence of very poor basic training facilities for librarians, the refusal of the government to acknowledge librarians as a professional body until very recently and the disregard of the State for anything to do with serious library or information work. This has created a fear of taking initiative and generally of being seen as trying to jump over the traditional boundaries of the library profession. Broadly speaking, Portuguese librarians come under two 'models' of librarianship as suggested by Mole[11]:

- conservative, where librarians are seen and see themselves as the guardians or custodians of knowledge and culture;
- technocratic, where the main concern is to ensure that the most efficient means are chosen to achieve the ends selected or imposed by external bodies, within the constraints which exist.

The user-orientation and the service ethos which have dominated the profession for many years, especially in the Anglo-Saxon and Scandinavian countries were really never a feature in Portuguese library practice.

Change in Portuguese LIS is undoubtedly needed. Libraries and information units can no longer cope with maintaining the balance between the old traditions and the new demands, new methods and new technologies. Information technology is going to be the catalyst and the concept of organisation development suggests a very attractive means for change. However, the question remains: what kind of organisation development? Many of the existing OD techniques are based on conditions of truth, trust, love and collaboration in the organisations. In Latin countries, where the bureaucratic model prevails very strongly, these conditions are never to be found. Hofstede says that organisations in Latin countries 'are

usually only changed by crisis and revolution' and Crozier[10] using his extensive research findings from two large French enterprises, goes further:

> 'change in a bureaucratic organisation must come from the top down and must be universalistic, i.e. encompass the whole organisation *en bloc* [...] Crisis is a distinctive and necessary element of the bureaucratic system.'

Crisis and changing the organisation *en bloc* involves dramatic structural changes. Thus, OD in Portuguese libraries would necessarily have to start with strong emphasis on changing old structures or introducing new ones, but the human-processing techniques could also be used to some extent, if they could be modified to fit new cultural needs.

Professional development

Crozier[12] maintains that for change to occur the complete system of action must be transformed. He explains that social institutions are made up of social relations which in turn are guided by social games. For change to occur it is not the rules of these games which must change but rather the nature of the games themselves. He presents as an example the transition from the feudal to the capitalist system, which did not come about by a change in the rules of the feudal game, but happened by the learning of a new and different type of game, by the various parties involved. The history of the library profession in its broadest sense seems to conform pretty much to these theoretical concepts in so far as it was only through professional development and collective action that the new games were learned both by the people inside and outside the profession.

According to Asheim[13], the three hallmarks of professionalism are a respectable body of knowledge and theory, autonomy and authority. The library literature from the more developed countries contains many references to pieces on professionalism which in the majority of cases show a common trend – a concern for a certain lack of recognition of library and information work as a profession on its own right. While it may not be very important to establish whether or not these activities can be classed as a profession in the traditional sense of the word, it is important to acknowledge the role of the associations and societies which fostered the work of library and information people in these developed countries and helped them in gaining some authority and autonomy in their social milieux. As regards the body of knowledge and theory, although the contours of information science are still not very clearly defined, the fact that the number of chairs for library and information studies in higher education institutions is increasing year by year reflects an acknowledgement by the scientific community of an intellectual substratum to this new discipline.

In Portugal the march for recognition of the profession as a social partner has barely started. The professional association is only eleven

years young, it does not grant charters, and the first modern library and information higher education courses started in 1984. Autonomy and authority come as a consequence of the level of education and training and, to some extent, of the perceived social usefulness of the would-be profession. In Portugal and certainly in many developing countries, librarianship never reached a stage of eliciting the kind of debate which has happened elsewhere around the question of professionalism. It is conceivable, however, that this state of affairs will accelerate the process of 'learning new games', in the terminology of Crozier, and that the development of the profession in the less developed countries will be able to leap over many of the steps that had to be gone through elsewhere. Moreover, it is also conceivable that the kind of profession which will eventually emerge in such nations is closer to information management in its broadest sense. This may come as a result of a variety of factors, the more important ones being the inevitable introduction of information technology, the relatively small weight of the traditional library profession and the new concepts about the role of the information worker in the organisation which are now taking root in the more developed countries.

The professional association in Portugal – Associação Portuguesa de Bibliotecários, Arquivistas e Documentalistas (BAD) – has, in spite of its short history, gained a great deal of ground in the way of improving the provision of LIS in the country. In 1979 it succeeded in persuading the government to place librarians and documentalists in the Civil Service on the same level as any other professional with a degree. BAD has accomplished more in bringing about change in the area of education and training for librarianship than the universities. Universities are conservative institutions, very slow to respond to change and in Portugal they were incapable of establishing the foundations for the development of modern educational curricula for librarianship or information science. The only two higher education courses that exist at present, at the Universities of Lisbon and Coimbra, were devised mainly by the professional association with minor inputs from academic staff. This is, in fact, a very positive feature as it has ensured that the syllabi reflect the most pressing needs of the country as a whole, but unfortunately it also has a negative side. Academic institutions are not really interested in offsprings they have not generated and in this case the adoption process is bound to be lengthy and tiring, making the association's presence needed at all times. The natural process would be for the universities to take over the responsibility for first educational courses, leaving the association with an advisory role in these and allowing it to concentrate on continuing education and true professional development. This process will not, however, be set in train before the country can count on at least a few people with higher degrees in library and information studies, ready to take up full-time academic posts and to struggle for the creation of fully-fledged departments within the universities. This is urgent and it is one of the most important components in the process of change in Portuguese library and information services.

The foreign consultants

A discussion on professional development is necessarily linked to the work of foreign consultants who appear on the scene due to the fact that many of the less developed countries lack the expertise needed to carry out certain tasks, especially those of a developmental nature. More often than not, such library development projects arise from foreign aid money which does not seem to have always been put to the best possible use. Lemos asks 'How many millions of dollars have been spent in aid to library development in developing countries in the last 30 years? Have the results been commensurate with the money spent?' In answering these questions Lemos tends to put part of the blame for the mismanagement of such funds on the work of foreign library advisers, who know little about the environmental and organisational intricacies of the aid-receiving countries and put forward models imported wholesale from their own countries. Some parts of the world are more exposed to this paternalistic attitude than others, but even countries with some library traditions, such as Portugal, can easily fall into the trap and end up in a situation perhaps worse than before.

Having said this, the positive role of foreign consultants must also be emphasised in all fairness. It is a known fact that faced with a lack of expertise, the people in power will put their trust in a foreign consultant much more readily than in one of their own nationals. This can be very advantageous if the consultant is prepared to co-operate with the country's professionals and act as the intermediary between them and the decision-makers in matters which affect library and information work. On the other hand, the local professionals are usually overburdened with more than their fair share of work due to the chronic staffing shortages and they can rarely take time off to do any consultancy work, whereas the professional consultants have the time that is needed to think about the problems. They have the added advantage of being on the outside looking in, something which is important for a clearer, global view of the situation.

Foreign consultants *can* play an important role in the transfer of library and information technology from the more developed to the less developed countries, but experience in Portugal shows that for full benefits to be obtained either by the consultant or by the country it is essential that the following conditions are fulfilled:

- consultants must be provided with detailed information about the country's LIS and particularly about the specific project to be undertaken, before the work is started;
- consultants' work should be carried out in close consultation with the country's professionals;
- any documents describing the project or reporting on its results must be disseminated in good time to all interested parties after completion of the work.

These points may seem perfectly obvious, but the sad truth is that they still have to be spelled out.

Still on the question of foreign aid, the responsibility of the aid-receiving governments cannot be excused. Often the aid money comes into the country and is handled by government officials who know very little about or are simply not interested in the country's library and information problems. On the other hand, the people in the profession are either unaware of the movements in the higher echelons of government or do not carry enough weight to make an impression on the decision-making process. Portugal is no exception, although it often does not qualify for aid from international agencies. Foreign and national funds which could be used effectively in the development of the country's library and information services are simply not spent or are spent in ways which do not benefit the infrastructures so badly needed. For such monies to be properly spent at national or regional level, full and accurate information should be readily available from a central body with the task of gathering, updating and disseminating all the relevant data. Such a body which unfortunately does not yet exist in Portugal, can be a very important generator of change and development if staffed by well motived professionals or at least by people who are very aware of the importance of information as a tool for growth and development.

National information systems

National information systems (NATIS) have been in the minds of library and information professionals for more than a decade, but it was at the Intergovernmental Conference on the Planning of National Documentation, Library and Archives Infrastructures organised by Unesco in 1974 that the idea became kind of institutionalised, internationally. The NATIS idea generated a lot of enthusiasm among library and information professionals, and in Portugal alone it was the theme for two national meetings of librarians, documentalists and archivists. Virtually nothing came out of these efforts, but the simple fact that Portuguese professionals agreed to discuss the topic two years running and went to the trouble of preparing many papers which have been compiled in three volumes of proceedings[14] means that the idea sounded worthwhile and certainly brought promises of change. Important projects subsidised by Unesco and other bodies were undertaken at national level in several countries in the wake of the NATIS meeting in 1974 (see for example Parker[15]) and in Portugal the government has agreed to sponsor a survey of the national information sources, in co-operation with BAD. This project is still under way.

From a point of organisational change, the NATIS concept had its uses. Firstly, it gave the library profession something tangible, which could be quoted and produced when talks were held with government officials on the topic of improving the country's LIS. Secondly, the objectives of NATIS[16] provided a step-by-step guide of the requirements for change in LIS at national level.

These were undoubtedly positive developments which would probably have never taken place if the 1974 Intergovernmental Conference had not happened, but after the initial euphoria, the NATIS idea seems to have been quietly dropped, probably because it proved far too ambitious in trying to involve all information sources in the country. Nevertheless, information systems have been set up at national level and we are now witnessing the first attempts at reviewing the situation of global or sectorial national information policies, five or six years after their introduction, in several countries. Canisius[17] reviewed the situation in some European countries and concluded that in the majority of cases the attempts to centralise and co-ordinate the provision of information were not successful. He points out MIDIST (Mission Interministérielle de l'Information Scientifique et Technique) in France as probably the most successful attempt. More recently[18], he describes the failure of the German programme for the setting up of twenty national information systems; more importantly, he attempts to derive some important teachings from such experiences, which he hopes will serve as guidelines to the new 1985–88 West German programme for specialised information. These teachings are probably one of the first real tests to the NATIS/UNISIST concepts and have been summarised as follows:

- before setting up any systems, all parties involved should be persuaded of their importance or, in other words, a campaign to create information mindedness should be set in motion;
- a flexible set of policies should be used, instead of 'a policy';
- a co-ordinating body should be created, rather than a functionally responsible one;
- production rather than structures should be the target of careful planning.

Conclusion

The need for change and development in library and information services in Portugal and undoubtedly in other countries where such services never reached a significant stage of development, is perceived and recognised not only by library and information professionals but also by people outside the profession. The unresolved question is how to bring about this change and development. The literature on organisation development can certainly be used as a starting point in the identification of the problems and possible solutions which may be adopted in the particular case of LIS. Libraries and information units are organisations and no matter how small they are, they are bound to be confronted by the same facts as any organisation is.

The question of the transfer of the methods and techniques used to handle change and innovation from the countries where most of the literature on organisational change comes from, i.e. countries of an Anglo-Saxon culture, to Latin countries is certainly not trouble-free. However,

this is an issue which needs a great deal more research not only in library and information services but in organisation theory in general, in countries culturally similar to Portugal. Such research should try to establish a conceptual framework for the management of change and innovation in these countries, extracting from the existing literature on change any points which may be applied cross-culturally.

The question of professional development is, in its broadest sense, of utmost importance to any serious process of change in library and information organisations. The important issue is not to establish whether library and information work is an autonomous profession, but to map out as clearly as possible the boundaries of these activities and to create an awareness of the vital importance of the work of library and information people, especially in a country such as Portugal, where the illiteracy rate is still as high as 25 per cent! The professional association(s) from the more developed countries can concentrate on these tasks and bring various advantages to the profession. In the less developed countries the role of the professional associations is perhaps more demanding, as they also need to devote attention to matters concerning continuing and basic education at all levels, not to mention a permanent effort towards obtaining recognition by society in general of the work library and information people are trying to accomplish. It is also important, however, that these professional associations which are destined to have very active lives do not crystallise in old-fashion ways but keep up constantly with the rapidly changing demands of the information market.

Information management consultants, especially non-native ones, can play a very important role in countries whose library and information units are as underdeveloped as in Portugal. They can act as true agents of change, but for that they must be fully informed about the country's particular problems in library and information matters. The information profession is not always very effective in providing information about itself, but it should also be the consultant's job to seek all relevant data about the country before travelling or upon arrival. Organisations such as Unesco and OECD which often engage consultants on behalf of the country's government have a special responsibility in compiling and updating the relevant data for purposes of briefing consultants.

The guidlines issued by Unesco to help countries formulate their national information policies and systems are a very important component in the process of change of library and information services. Such guidelines do, however, go out of date and they need to be constantly revised, by confronting the recommendations with real life information systems set up at national level and this is particularly relevant to countries like Portugal, where resources to invest in information are usually very meagre. These countries cannot afford to fail and start again and it will be apposite to mention here the Fourth Session of the Intergovernmental Council for the General Informations Programme[19], where attention was drawn to 'the need to extend substantive support to the requirements of the so-called medium-developed countries' (paragraph 33).

Besides the actual discussion on change, the writing of this paper was also prompted by the desire to report to the international library and information community on the situation in Portugal, as very little information on this country has come to light over the years. This is all the more important when Portugal is about to join the European Economic Community and certain important gaps in the field of specialised information will have to be filled in the short run. It is also hoped that this will be a contribution to an exchange of ideas with countries with similar organisational traditions and identical problems in their library and information scene.

ACKNOWLEDGEMENT

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User survey of an international library: expectations and evaluations

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This paper is an attempt to describe aspects of a user survey and its findings in a particular library environment. Whilst it is essential to explain the background, nature and reasons for types of questions, the full data retrieved and the possible complexity of its multivariate analysis are far too great for this paper alone. This paper is restricted to an hypothesis and the questions and findings bearing directly on it.

In a library environment where space, working conditions, access and control systems, and overall structure are perceived to be detrimental to optimum usage and retarding influences on service operations, development and expansion, we are required to rethink comprehensively the future development of library and information services. We have to consider unique factors pertaining to current, future and potential development. The needs of the user-group segments are crucial in this rethinking.

Introduction

The object of the exercise is to perform an overall evaluation of the INSEAD library service as perceived by segments of the overall user-group. The aim is to translate the results of such an evaluation into keener insight into the habits of the users, and ultimately into policy formulation and action for the future development of the service.

Basically, we perceived the library to be requisite of new dynamic services to resource an increasingly demanding and heterogeneous group of users. We postulated that the user-group would welcome the idea of modernisation and of diversification of information resources and their media. We hypothesised that in a heterogeneous, international environment – nationality was one of the most significant factors in not only signalling differences of habits within the group but also determining expectations, usage and evaluations of the library services.

Aims and objectives of the survey

The objective of the survey is to be attained in four stages:

1. Data collection and analysis of usage perceptions and evaluations of the first group (split into two over MBA promotions).
2. Data collection and analysis of usage perceptions and evaluations of the second group (faculty).

Aslib Proceedings, 37 (4), April 1985, p. 195–205. Printed in Great Britain.

3. Analysis/reconciliation of findings. Submission to policy-forming body.
4. Policy analysis – shifts of emphasis in collection and services. Quantitative and qualitative recommendations.

The framework and scope of this paper will be restricted to the behavioural and perceptual aspects of Stage 1.

Demographic data and national groupings

Analysis was run to determine which of the variables:

- age
- education
- working background
- nationality
- length of work experience prior to current year of study

emerged as the correlate of respondents' evaluations of the library questions. Nationality stood out as the single most significant correlate of perceptions. While the other variables are evidently important in explaining perceptions and behaviour they were not so effective as nationality in discriminating among respondents.

National groupings in an international library

Within the user-population it has been perceived that there is an extremely wide disparity between those users who appear to have a swift understanding and aptitude to apply principles and procedures fundamental to current information-seeking and retrieval (ISAR) practice, and those whose approach and attitude to grasping and applying such concepts is slower. For some a brief, indicative explanation was sufficient; for others the basic concepts were lacking.

In one group alone, we have 33 different nationalities represented by participants who have been selected for high degrees of academic and career attainment, and a motivation to pursue a demanding programme of study. Hypothetically, the heterogeneity in this group alone suggests diverse information-seeking habits and library practices.

Having adopted the variable of nationality, we would like to postulate an hypothesis which can be tested by analysing the data assembled. We are proposing that nationality is a factor which – in an international context – can be a major determinant of ISAR and library habits and expectations. Given the heterogeneity of nationalities in the user-group it is useful to test such an hypothesis by seeing if survey results support such a notion, and if so to what extent and consistency, and to determine how this can contribute to future policy.

It may appear adventurous to argue a similar North-South library divide analogous to that which exists in the literature of Economics. The split is clear in terms of economics and industrial development – the developed, industrial/post-industrial North as opposed to the developing/

emerging South. In transposing this divide hypothetically into the world of librarianship, we seek not to be deliberately contentious but merely to pose a broad explanation for the phenomenon such as we find in an international environment.

To expand this hypothesis, the yardstick of professionalism in librarianship is not only of recognised value, but also perhaps indicative of a national approach to and development of libraries and librarianship. In major developed national library networks, the public library can be seen as the base – the cornerstone and foundation of the national library service. In any comparative survey, however brief, we may look first to the development, quality and professionalism of the public library service for indicators of standards. In this context the statistics in Tables 1 and 2 are revealing.

TABLE 1. *Number of public library loans per capita*[1].

		)1970(	)1980(
UK	(1961)—	8.76	11.5
USA	(1960)—	3.0	4.34
Denmark	(1969)—	8.3	15.2
Finland	(1971)—	7.66	—
Sweden	(1971)—	7.12	9.28
Holland	(1971)—	4.82	11.25
Norway	(1970)—	2.0	4.0
W. Germany	(1968)—	—	2.78
Italy	(1972)—	0.19	—
France	(1970)—	0.89	1.66
Spain	(1971)—	0.1	0.16
Portugal	(1971)—	—	0.6

TABLE 2. *Number of volumes per capita in public libraries*[1].

		)1970(	)1980(
UK	(1961)—	1.5	2.3
USA	(1968)—	0.93	1.94
Denmark	(1969)—	3.55	5.9
Finland	(1971)—	2.7	4.85
Sweden	(1971)—	3.25	4.7
Holland	(1971)—	1.0	2.13
Norway	(1970)—	2.0	3.2
W. Germany	(1968)—	0.75	1.0
Italy	(1972)—	0.32	—
France	(1970)—	0.74	0.92
Spain	(1971)—	0.26	0.32
Portugal	(1971)—	0.79	0.63

To elaborate: the North – Scandinavia, the UK, Northern Europe and North America – has a tradition of the free public library, of open access material freely available to all, of the co-operative free dissemination of information, and of service to readers as a matter of professional concern.

The South – especially the Mediterranean countries – is not so much lagging behind as traditionally adoptive perhaps of different goals, for reasons political or economical, enforced or chosen. In library terms, emphasis seems more on conservation than dissemination, on sufficiency and perhaps isolation rather than co-operation, on closed access service rather than openly and freely exploiting literature to satisfy information requirements. Arguably this notion is paramount to the development of individual information-seeking techniques, habits and library practices. Arguably too, it is testable.

Results

The survey was distributed to 420 MBA students at different phases of progress through their study year. Response rate was 47 per cent or a total of 198. The overall group has been split into two. With a double/overlapping intake, Group 1A constitutes those at quarter- and at mid-term of their studies; Group 1B those who have completed a full year of study.

Figure 2 shows the perceptions of Group 1A on general usage of libraries before and then during the study year in question. It is interesting to juxtapose these perceptions with relative overall comparative ratings (the initial part of Question 14 appended).

FIGURE. 1. *Nationalities by groups.*

Anglo-American 'AA'	*German-Scandinavian 'Nordic'*	*French-Latin 'Latin'*
Canada	Germany*	France*
USA*	Denmark*	Belgium*
UK*	Finland	Spain
Israel	Norway	Italy*
S. Africa	Holland*	Portugal*
India	Sweden	Austria
Hong Kong		Greece
Australia		Switzerland
New Zealand		

* = Dominant nationalities.

(Some 15 other countries were also represented – too diverse and small a group, 6 per cent only of total sample and overall user-population).

FIGURE. 2. *Library usage – Group 1A (students at quarter/mid-term).*

	Former usage	*Actual usage (INSEAD) (estimated)*	*Comparative rating*
Summary (overall) 88	3.74	3.93	3.73
AA 33	4.06	4.36	2.69
Nordic 15	4.60	4.26	4.00
Latin 40	3.13	3.45	4.60

FIGURE. 3. *Library usage – Group 1B (students after complete year of study).*

	Former usage	*Actual usage (INSEAD) (real)*	*Rating comparative*
Summary (overall) 83	3.89	4.01	3.28
AA 22	4.55	4.23	1.70
Nordic 15	4.27	3.68	2.73
Latin 46	3.54	3.83	4.14

Those respondents with still little experience of the library generally assume that they will use the library more – if only slightly – during their study year, except for the Nordic Group.

Although none of the national sub-groups of Group 1A are extensive users of libraries we do begin to get signals of different extents of usage from the separate national sets. Within these national groupings it is interesting to note the higher the former usage, then the lower the overall rating, and vice-versa.

If we now refer to the results for Group 1B – full-term experience – in Figure 3, we notice an immediate change, even a development, in ratings. Current usage has now significantly dropped below their perception of former usage for the two national groups with hypothetically the more sophisticated information background. Whilst for the national sub-sets AA and Nordic dissatisfaction has been quantified, the Latin Group with noticeably lower former and actual usage, is less critical. Juxtapostion with an overall comparative rating is now more revealing full-term than for Group 1A. All ratings drop quite considerably, but significantly relative to the nationality hypothesis.

FIGURE 4. *Relative-compared ratings/importance ratings per dimension (averaged) – Group 1A.*

Sample size	*Summary (overall) 88*	*AA 33*	*Nordic 15*	*Latin 40*
Breadth	3.43	2.41	3.64	4.19
	5.47	5.36	5.33	5.47
Depth	3.81	3.03	3.93	4.33
	5.62	5.64	5.27	5.63
Currency	4.21	3.48	4.39	4.73
	6.16	6.10	5.73	6.26
Library staff	4.82	3.93	5.53	5.13
	5.66	5.40	5.87	5.76
Atmosphere	3.29	2.64	3.47	3.94
	5.68	5.33	5.73	5.76
Access	4.46	3.62	5.00	4.91
	5.85	5.73	5.93	5.76

FIGURE 5. *Relative-compared ratings/importance ratings per dimension (averaged) – Group 1B.*

Sample size	*Summary (overall) 83*	*AA 22*	*Nordic 15*	*Latin 46*
Breadth	3.13	1.95	3.33	3.42
	5.58	6.14	5.60	5.26
Depth	3.19	2.10	2.93	3.72
	5.54	6.04	5.30	5.28
Currency	3.58	2.85	3.27	4.08
	6.07	6.43	6.10	5.77
Library staff	4.59	3.76	4.27	5.19
	5.61	5.24	5.73	5.78
Atmosphere	3.44	2.00	3.33	4.25
	5.29	5.62	5.73	4.88
Access	4.06	2.90	4.33	4.69
	5.80	5.95	6.10	5.55

Averaged ratings in per cent. Overall = 53%. AA = 37%. Nordic = 51%. Latin = 60%.

Nationality as a critical factor in differing perceptions is borne out further in the following response tables which analyse in greater depth the overall rating given above. We asked the respondents (A) to continue their comparative evaluation according to designated criteria and (B) to state degree of importance they attached independently to these criteria according to their needs: (questions 14b and c appended).

The two responses (A) and (B) are juxtaposed vertically in order to gain an insight into the difference between their comparative rating and the importance they attach to that particular criterion. Again, the hypothesis is supported consistently. In each case the Anglo-American (AA) Group is far more critical than the Latin Group. There is a wide discrepancy between the comparative and importance ratings for the Anglo-American Group as opposed to the scores which emerge for the Latin Group. Whilst members of the former are most critical and dissatisfied with respect to their needs, the Latin Group is much less so.

Although the figures for 'competence of library staff' follow the emergent patterns, they are significantly and happily higher – an important consolation especially when perceived by the user-group.

The inferences that may be drawn are manifold, and merit further deliberation. The implications for assistance and user-education are more definitive. Whilst criticism flies at the collection and resources, especially from the Anglo-American Group whose expectations and former habits engender a greater dissatisfaction, the Latin group is less critical, and in fact more positive in that their expectations are lower and more perceptibly attained. Whilst this has implications for information resources and services as a whole, it also infers questions not so much of library guidance and instruction but knowlege and overall awareness of information techniques and systems. With the final part of this evaluative question – to advance from comparative to absolute/independent ratings based on usage, knowledge and experience of the library alone, we see from Figures 6 and 7 that the results support the hypothesis again.

Exploding the figures into percentages, or scores out of 100, gives a keener perception of the variance in Group 1B and reveals a comparative and relative 'satisfaction' value across the groups as shown in Figures 5 and 7. 'Atmosphere of the Library' again causes a disturbance across both groups, a notable factor with a user-group of such diverse origins and backgrounds. In this final section of the question, we introduced an extra criterion – that of 'Frequency of Missing Volumes' to see if this was a significant point and also to see if it in any way correlated to any of the other criteria. In particular, one might expect that the 'deeper' the collection, the less likely would respondents perceive a problem with missing volumes.

FIGURE 6. *Absolute ratings (averaged) – Group 1A.*

Sample size	*Summary (overall) 88*	*AA 33*	*Nordic 15*	*Latin 40*
Breadth	4.27	3.73	4.31	4.65
Depth	4.69	4.10	4.69	5.03
Currency	4.53	4.57	5.00	4.31
Missing volumes	4.27	4.26	4.42	4.31
Library staff	5.39	4.94	5.64	5.63
Atmosphere	3.60	2.94	3.71	4.23
Access	4.83	4.44	5.21	5.00

FIGURE 7. *Absolute ratings (averaged) – Group 1B.*

Sample size	*Summary (overall) 83*	*AA 22*	*Nordic 15*	*Latin 46*
Breadth	3.77	2.95	3.93	4.02
Depth	3.77	2.91	3.60	4.34
Currency	4.17	4.24	3.73	4.29
Missing volumes	3.31	2.95	3.33	3.57
Library staff	5.20	4.38	4.93	5.67
Atmosphere	3.75	2.81	4.06	4.29
Access	4.27	3.86	4.07	4.57

Averaged ratings in per cent. Overall = 58%. AA = 49%. Nordic = 56%. Latin = 63%.

Conclusions

Whilst dissatisfaction with library services may not be uncommon – especially in a period of great change and in a specialised environment serving an intensely heterogeneous population, it is valuable to gain measures of expectations and criticism from specific segments of the user-group.

The 'Nationality factor' has repercussions for user-education, training and user-assistance. Whilst one sub-group may require a substantially different induction because of a less critical, less informed approach to ISAR generally, several factors emerge to be important for library staff:

1. Scorers and ratings reveal that certain sectors of the user-group behave, perceive and evaluate very differently from each other. Whilst major trends are repeated in varying degrees across sub-groups, certain differences within groups give rise to implications for types of future service, their presentation, availability and accessibility.

2. A 'reverse maturation' factor is visible in the overall comparative ratings of Figures 2 and 3: increasing the usage-experience of the library gives a decreasing level of satisfaction.

   It is important to observe too the variance of figures from the norm. As with 'Atmosphere' on p. 202, initial signals emerge for future planning, accommodation facilities, and lay-out of resources.
3. To assist, inform and make the user aware of information possibilities, systems and channels. This devolves on the librarian to diffuse and disseminate the information services available, by putting the user in touch.

Indicators here are of dissatisfaction. While a subsequent paper will take this a stage further by analysing preferences selected in a resource allocation exercise, here we must take steps to respond to the varying levels of usage and perception within the group as a whole. While guided tours, instruction and user-seminars all have their necessary value, we are now more able to discern what, how and to whom.

Details of specific behaviours and perceptions of various segments of the user-group can be provided in various combinations. Whilst conclusions drawn above point in definitive directions, it is important to stress that the overall technique of appraisal and analysis has proved an extremely useful and powerful tool. Whilst implications on services are not definitive from the evidence detailed here alone, the method of survey can and does contain the data which can give pointers and indications as to how and where the group and its sub-groups would like to see strengths in the services and resources. Also we are able to determine how strong or how desirable such preferences are seen to be in relation to each other. This is the next step in the research started here.

ACKNOWLEDGEMENT

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REFERENCE

1. *UNESCO Statistical Yearbooks*, 1963–1983.

Appendix: excerpts from questionnaire

SURVEY OF USERS OF INSEAD LIBRARY

INSEAD LIBRARY is concerned about maintaining library vitality in an age of increasing costs, and diversifying sources and media of information. It is important that INSEAD provides the library resources and services that are adequate to the needs of future participants. They can benefit from your experience by your contribution which can change and improve the library. To this end it will be beneficial to know where you find its strengths and weaknesses. Your taking a few minutes to complete this questionnaire will aid us in the effort to best serve your successors.

Please be as frank in your evaluations as possible. The questionnaire has been designed to allow ease of interpretation and response.

Please note at the end of the questionnaire we have provided a space for additional comments and criticisms which you may have about current library operations.

Thank you.
D. Gautschi

B. Norton

14a. We would like you to compare INSEAD LIBRARY with the library of ONE other institution.

What is the name of the other institution?_____

Please rate INSEAD as compared to the other institution in terms of overall quality of the library. (circle one)

Much worse than	(1)	
Somewhat worse than	(2)	
Slightly worse than	(3)	
About the same as	(4)	
Slightly better than	(5)	
Somewhat better than	(6)	
Much better than	(7)	the other institution.

14b We would now like you to rate INSEAD relative to the other institution in terms of six dimensions. These dimensions are:

(1) Breadth of the collection: extent to which the collection of books and other library materials span the topics of interest to you.

(2) Depth of the collection: extent to which the collection includes books and other materials which satisfactorily represent knowledge within each of the subject areas of interest to you.

(3) Currency of the collection: extent to which the collection includes books and materials which represent the state-of-the-art in subjects of interest to you.

(4) Support from professional library staff: extent to which the librarians can satisfy your library-related needs.

(5) Atmosphere of the library facilities: extent to which the library environment is conducive to your intended use of the library.

(6) Access to needed materials: extent to which your attempts to obtain information and library materials are not hindered by unnecessary rules or poor service.

INSEAD is: (for each dimension, circle one response)

Dimension	Much worse than	Worse than	Slightly worse than	About the same as	Slightly better than..	Better than..	Much better than..
(1) Breadth of the collection	1	2	3	4	5	6	7
(2) Depth of the collection	1	2	3	4	5	6	7
(3) Currency of the collection	1	2	3	4	5	6	7
(4) Support from professional library staff	1	2	3	4	5	6	7
(5) Atmosphere of library facilities	1	2	3	4	5	6	7
(6) Access to needed materials	1	2	3	4	5	6	7

than the other institution

14c Now we would like to know how important each of the six dimensions is to you in evaluating INSEAD LIBRARY (for each dimension, circle one response)

Dimension	Unimportant Very		Slightly	Neutral	Slightly	Important	Very
(1) breadth of the collection	1	2	3	4	5	6	7
(2) Depth of the collection	1	2	3	4	5	6	7
(3) Currency of the collection	1	2	3	4	5	6	7
(4) Support from professional library staff	1	2	3	4	5	6	7
(5) Atmosphere of library facilities	1	2	3	4	5	6	7
(6) Access to needed materials	1	2	3	4	5	6	7

15. Now we would like you to evaluate INSEAD LIBRARY with respect to your needs. Listed below are seven scales and dimensions which should be familiar to you. For each dimension, rate the library first with respect to your needs.

For YOUR purpose and needs...

A	The breadth of the collection is	NARROW (-)	1	2	3	4	5	6	7	BROAD (+)
B	The depth of the collection is:	SHALLOW (-)	1	2	3	4	5	6	7	DEEP (+)
C	The currency of the collection is	CURRENT (+)	1	2	3	4	5	6	7	OUT-OF-I (-)
D	The occurence of missing volumes is	RARE (+)	1	2	3	4	5	6	7	COMMON (-)
E	Support from library professional staff is:	GOOD (+)	1	2	3	4	5	6	7	POOR (-)
F	The library atmosphere is:	CONDUCIVE (+)	1	2	3	4	5	6	7	DETRIME (-)
G	The access to materials is:	POOR (-)	1	2	3	4	5	6	7	GOOD (+)

One-woman show: the case of the electronics library

Marjory Sliney
Librarian, Dublin Public Libraries

The library and information needs of a small Irish electronics company are outlined against the backdrop of existing library services outside the company. The alternatives available and the setting up of a library and information facility – as a one-woman show – within the company are documented.

On reading A.M.J. Perrott's recent article on a One-Man Band Library[1], I was motivated to detail some of the ways in which I tackled my first 'one-woman show'[2].

Background to the company and its information needs

In 1981, when I was appointed as Consultant Librarian to Lake Electronic Designs, Dublin, the company employed some 100 people in the manufacture of telecommunications equipment, both for the home and export markets. At that time, 80 people were directly involved in manufacturing; the remaining staff were in R&D and marketing. With the exception of a few people, all the non-manufacturing staff were electronics engineers. With continued expansion and the need to have up-to-date information, the company found in 1981 that a critical appraisal of its information needs was required. The practical necessity for this arose, when on moving the manufacturing function to a second building, an enormous mountain of trade literature was dumped on the factory floor! Much literature (trade, periodicals and data-books) was available within the company, though mainly in 'private collections' in individuals' offices.

Therefore, my task was to prepare a report for management which would:

- identify the information needs of personnel;
- suggest ways in which these could be met;
- if necessary, make arrangements to set up a library and information service within the company.

Identification of library and information needs

In considering the information needs of engineers in general, one can state that these are for:

1. current information in the subject area;

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2. specific information and factual data, e.g. patents;
3. information outside the immediate field, e.g. marketing, etc[3].

In a manufacturing context, need is compounded by a necessity for quick access to, and retrieval of, any of this information.

The company's specific needs can be considered in terms of the four functional areas, i.e. design, manufacturing, marketing and finance.

Design
This function which undertakes R&D had very specific needs for:

- current research reports in telecommunications and related areas;
- current standards;
- trade literature;
- data-books, etc.

Manufacturing
Since this function was heavily dependent on the design team, its information needs were minimal. The main need here was for trade literature (both catalogues and directories) as it was essential for ordering components, checking prices and ensuring that suppliers met the firm's requirements.

Marketing
The diverse needs here called for:

- market research reports;
- current telecommunications research reports;
- government publications;
- patents;
- standards;
- statistics;
- economic/financial/political data;
- legal information.

Finance
The highly specific needs in this function were for:

- economic reports;
- statistics;
- financial/political data.

As has already been noted, much literature existed in the company. Therefore, many of the above needs could, in fact, be met if the material being received, was organised. However, there were many gaps and it was necessary to look at what was available from existing external library and information services.

External library and information services
It is not necessary to detail all the external services which were examined. Suffice it to say that all relevant special/university/public libraries in

Dublin were considered in terms of

- their ability to meet any, or all, of the needs outlined above;
- their accessibility (a major consideration in terms of industry);
- costs.

All specialist information services elsewhere, e.g. BLLD, Aslib and suppliers of online services, were also considered in similar terms. At this stage, I was in a position to offer alternatives as to how the company's information needs might be most effectively met, based on my knowledge of the company's own information resources and what would be available from external sources.

Alternatives

I outlined for management the implications of providing, or not providing, a library and information service within the company. My recommendation in favour of providing an in-company service was based on, among other factors:

- estimated level of demand;
- ready availability of some material, e.g. periodicals, trade literature;
- time;
- cost-saving.

Within an organisation such as Lake Electronic Designs (LED), I suggested that this service could be provided at one of three levels: minimum, moderate or full. The service at the *minimum* level would include:

(a) basic information (quick reference);
(b) referral to other libraries in the Dublin area;
(c) current awareness-contents pages of selected journals received at LED issued to staff on a regular basis;
(d) literature, standards and patent searching outside the company;
(e) retrieval system for trade literature.

At the *moderate* level, the service would be expanded and include:

(a) general reference;
(b) interlibrary loan facilities;
(c) current awareness service;
(d) small-scale SDI based on individual profiles using periodicals received and abstracting services;
(e) literature searching;
(f) retrieval system for trade literature;
(g) expanded periodical collection.

The service available at the *full* level would include all items mentioned at the *moderate* level and, in addition, a full online service. The various levels of service as outlined were costed: the desirable staffing levels were given. I recommended in favour of the *moderate* level. A very practical

reason ruled out a full service – the fact that a Post Office modem could not be supplied quickly and, this, despite the fact that the company supplied modems to the Post Office!

Organisation of library service

Having established that it was more cost-effective to have an in-house library and information service, my next task was to set it up. As the service was to cater for twenty personnel, it was my intention to establish it and, then, hand it over to either a librarian who would work on a part-time basis or an experienced library assistant. In all, I spent almost six months with the company, operating as a One-Man Band (OMB).

I will not detail the physical layout of the library, but rather will concentrate on different components of the library service. This, to me, seems more important than details of square measure.

As in any library, the users are an important group and sometimes, have to be convinced of the value of such a service. However, in this company, the staff were totally committed to the idea of a library and information service – even if a few only saw it in terms of putting some order on the chaos of the trade literature!

Perhaps, the most important aspect of establishing an OMB is to make contact with other libraries and librarians. One should, as far as possible, try to avoid unnecessary duplication and make the maximum use of available external sources. To this end, LED joined Aslib and Aslib Electronics Group. The company became a registered user with BLLD. Corporate membership of the Irish Management Institute was taken and this entitled company employees to use its library. More formal contacts were established with the libraries of specialist semi-state agencies, e.g. AnCO (the Industrial Training Council), Coras Trachtala Teo (the Irish Export Board) and the Industrial Development Authority. The specialist business service – the Commerce and Technology Library – of Dublin Public Libraries was also used.

At the time of my appointment, the firm took some forty-five periodical titles. Many, but not all, were received on a controlled-circulation basis. An essential task was to organise these periodicals as some titles were received by certain individuals, while all employees received a copy of items such as *Electronics Weekly*. New titles, and all existing subscription titles were organised through a subscription agent: some may feel that this is a luxury for an OMB, but I would argue that it is essential if you wish to keep periodicals up to date.

Using the periodical stock, now numbering some 80 titles, it was possible to prepare a current awareness bulletin based on the contents pages of selected journals. For practical purposes, I found that ten pages was regarded as acceptable: more than that and users found they were confronted by too much information. This would seem to be in agreement with King's finding[4].

The normal library duties of acquisitions and cataloguing were under-

taken. Apart from new periodical titles, most acquisitions were reference material, e.g. maps, atlases, trade directories.

Organisation of the trade literature was essential if it was to be fully utilised. Trade literature – catalogues, data-books and directories – was readily available within the company. The data-book collection (essential to electronics) was not as comprehensive as it might have been for two reasons:

1. weak bibliographic control in this grey area;
2. irregular revision patterns of the data-books[5].

Superceded editions of data-books were held as the design function considered them useful for reference purposes.

Catalogues (usually component manufacturers' catalogues) and directories were received regularly and this appeared to reflect the publishing pattern in relation to this form of trade literature. Superceded catalogues and directories were discarded.

In order to make the trade catalogues useful, it was necessary:

- to arrange them (A–Z, by manufacturer);
- make a catalogue of the contents of each (A–Z, by manufacturer);
- devise a retrieval system (subject index, A–Z, by component);
- to translate all non-English items.

When I left the company, this mammoth task was not yet complete, but the system had been established and I understand that it is running satisfactorily.

Summary and conclusions

I have outlined above how a library and information service was established as an OMB in a small electronics company. The company's information needs were identified and consideration was given to how these needs could be best met. Having recommended in favour of an in-house library service, I have detailed some of the technicalities involved in establishing it.

If I have failed to mention some of the standard problems in relation to OMBs – budget, accommodation, etc., it is only because they did not present themselves as problems. Also I feel that some of these problems may be peculiar to a particular organisation. In what I have outlined, two problem areas emerge which are not organisation-specific:

(a) the sheer volume of the trade literature;
(b) inadequate bibliographic control and poor revision patterns of data-books or other specialist literature.

It would seem that (a) is not necessarily an insurmountable problem. However, (b) is a problem that Aslib could raise with some of the relevant bodies responsible for publishing the more substantive, yet elusive, specialist literature.

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Non-use of library-information resources at the workplace

a comparative survey of users and non-users of onsite industrial-commercial services

Margaret Slater

Under-exploitation of any service provided by an employer is a serious waste of organisational resources. It is therefore important to explore the reasons why people do not take full advantage of library-information services at the workplace. To this end Margaret Slater has studied three occupational groups (all in the industrial-commercial sector): chemists, engineers, and insurance personnel.

The qualitative study described in this report is set within the wider context of the whole potential user population. It does not focus solely on the non-user in isolation but contrasts the information-seeking habits, problems, attitudes, beliefs, and motivations of users, deliberate non-users, and enforced non-users (i.e. those who lack any library-information facilities at work).

Slater has isolated certain factors predisposing to unsatisfactory levels of usage and her results will be extremely useful to information providers. Management too should be equally interested in participants' comments on the causes and nature of more wide-ranging problems at work (not necessarily information-related).

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ASLIB PROCEEDINGS

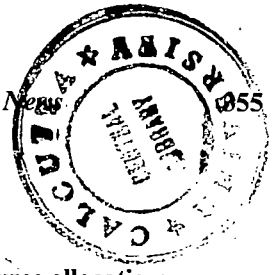
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What's so special about the special librarian?

Sylvia P. Webb

Head of Business Information, Stoy Hayward, London

'Communication and organisational abilities of a high order', 'marketing and training skills', 'management experience', 'innovator', 'enthusiastic and lively personality' – these are just some of the requirements listed in recent advertisements for posts in industrial and commercial libraries. So what of the dreaded 'library image' – the well-known stereotype playing a passive, sometimes remote, role? – This is hardly described by the above turns of phrase.

Such stereotypes, although hopefully becoming extinct, do still exist, but fortunately are rarely to be found in business libraries. There is a simple reason; the library or information service in a business organisation has to justify its existence along with all the other departments which make up a company or firm. It has to be seen to perform a function which contributes to the business activity of that organisation. It cannot be viewed in isolation, as something self-contained and set to one side. A business library or information service should be a key department, a central core which is not just responsive but dynamic; changing and developing with the organisation.

Some of the personal qualities required to manage such a department have already been mentioned. What others are required; how are such qualities and skills acquired; what do they contribute to the service? If the library or information unit is to be seen as an integral part of the organisation then the librarian's role will require a much broader involvement in the company's activities than the term 'librarian' might at first suggest. To return to recent press advertisements, job titles have included not only librarian and information officer, which have been in use for many years, but also manager of information services, resources co-ordinator, information services librarian, information manager; emphasising both the wider range and format of source material, and the management role. At the 1984 Aslib conference Dr Sandra Ward and Mike Allen of the Glaxo Group[1], said that qualities sought by them when recruiting were maturity and ambition not *just* technological appreciation and subject skills; whilst Derek Barlow, of Kent Barlow Information Associates[2], saw the industrial librarian's role as being an amalgam of marketing and entrepreneurial skills, stressing the creative and innovative aspects of the job.

In the field of management training, increasing importance is attached to interpersonal and communications skills. To the business librarian who

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is in a position of continuing communication with individuals at all levels in the organisation, such skills are vital. For example, the enquiry process involves the use of interpretive ability – being able to ascertain exactly what the enquirer is seeking; information skills – identifying and searching the most appropriate source; selectivity – extracting only that which is relevant and not subjecting the enquirer to 'information overkill'; and communication skills – to ensure that the outcome is presented in a concise, unambiguous and readable form to the enquirer.

The meeting, whether internal or external, in a committee or interview situation, requires expert use of those same skills in a different setting. Behaviour at meetings involves sensitive observation and awareness of the other participants and their respective roles i.e. chairman, secretary, interviewer, interviewee; as well as the ability to speak, to listen and to write effectively.

Communications skills are equally as important for the various public relations aspects of the job. These may concern the promotion and presentation of the library and information service within the organisation, or could involve contact with other organisations and individuals either by telephone, written communication, or personal attendance at various conferences or meetings. Any form of external contact requires you to carry out three roles; that of representing:

(a) the organisation;
(b) the library & information service;
(c) yourself, as a professional person.

Quite a responsibility – but one which opens the door to a whole range of exciting opportunities in terms of career, continuing development of the information service, and further promotion of the organisation.

What are the practical considerations of the public relations function for the industrial or commercial librarian? How can it be carried out most effectively? When performing the three roles described in the previous paragraph, of which (b) and (c) apply to both internal and external contacts, consideration needs to go beyond such attributes as a good telephone manner, the ability to write an effective business letter or useful article, and positive self-presentation.

Whilst these form an excellent and essential basis for the public relations function, having something useful to communicate is vital. Providing an information service which continues to be relevant to the organisation's needs requires constant awarenesss of its objectives and various, possibly changing or expanding, business activities.

Such information is equally valuable in communication with clients, or other organisations, wanting to know more about the company's products or services. It may be that the library or information service is the first point of reference for the outside world, so your response could be the starting point for the next big contract. Make sure that you know enough about your organisation's business to set up the next stage of the deal!

The effort made to gain a wider knowledge of the business will be well-repaid in terms of personal development. It creates opportunities to broaden

the role of the library, at the same time firmly establishing it as an integral part of the organisation; and to contribute to a wider range of general activities. At the same time the librarian should not lose sight of the need to keep up to date with developments in the library and information profession, so that appropriate new services and methods of information organisation can be adopted. The key to an effective library is simplicity and efficiency, with constant review not only of resources, but the methods and procedures which stand behind their use. What is needed is a systematic approach to the overall management of the information service, an ability to organise work cost-effectively, assign priorities, meet deadlines, manage time. Carefully-planned distribution of work can increase job satisfaction and motivation, as well as achieve an efficient service. The industrial and commercial library is often a small unit, possibly a 'one man band', i.e. the service is run single-handed, or with little in the way of support staff, therefore well-planned systems of operation are most important. The checklist approach is particularly helpful and is described in *Creating an information service*[3].

Establishing an effective library and information service with informed and well-motivated staff, is just the beginning! Not only must it be good, it must be seen to be good. Promoting the service means ensuring that all members of the organisation are aware of its potential. This can be helped by making certain that the library combines an attractive physical environment with ease of use. For example, simple classification and loan systems are to be preferred; stock should be arranged so that it is easy to locate; labels and notices should be professional-looking, clear, unambiguous and helpful. Not too many notices, and some thoughtful use of colour can do wonders in terms of signposting. Rules and regulations should be kept to a minimum and serve the single purpose of providing a better service.

Having a good product also means selling it if you are to stay in business. Just choose your method. Presentations, newsletters, bulletins, guides, demonstrations, can all be used effectively. If you make a presentation keep it brief, use good visual aids, and exude confidence! When writing a newsletter or bulletin make it readable and informative, something that is seen as useful to the organisation's business activities. Design a logo and use a particular colour of paper so that it is easily recognisable; if possible get it typed on a word processor for ease of editing and professional finish. If you prepare a written guide to the library and information service, why not write it in glossary form[4], or index it, so that it is easy to use. If you have access to any online services, demonstrate them. If you have not, get some on free trial.

Keep in touch with the outside world, talk to other librarians and exchange ideas. Join one or more of the formal or informal groups which are increasingly used as forums for discussion e.g. the Library Association Industrial Group, Aslib's Economic and Business Information Group, the Accounting Librarian's Group. Reference is made to these and others in *Creating an information service*[5]. No library is self-sufficient and

increasingly co-operation is taking place between libraries of all types, and in various ways. One such initiative has been a co-operative training venture between Stoy Hayward, a leading firm of chartered accountants, and Westminster City Libraries. This has provided the opportunity for trainees in a special and a public library to observe at first hand the similarities and differences which exist in the two types of service, and how various problems are handled.

Training, both in-house and that which is externally-organised, is a continuous process necessary for library personnel at all levels, particularly with the present rapid developments in information technology and the increasing managerial responsibilities of the librarian's role. So an ongoing enthusiasm for learning and the ability to adapt and change must be part of the librarian's psychological make-up. Continuing education is being given more emphasis by the professional bodies, and a number of useful short courses and seminars are now on the market. Aslib[6] and the Library Association[7] can provide details of these.

Working in a business environment means working to deadlines. You need to be able not only to find information, but to find it quickly, and ensure that it is accurate, whilst remaining helpful and approachable to the other enquirers, all of whom probably require 'instant information'! As well as unflagging energy and the ability to respond quickly and positively to pressure, such an environment calls for flexibility and innovation. There is a need for constant objective review of some of the more traditional approaches to the organisation of a library service, which may not be appropriate to the needs of your particular industrial or commercial organisation. Keep seeking those which are – determination is also a highly desirable quality in the special librarian!

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Bibliographic current awareness services – a review

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Draws together the various options for current awareness services and assesses the future for such services. Attention is focused on the services offered by text retrieval packages in support of current awareness services. Both microcomputer and minicomputer/mainframe packages are considered. A review of other options for current awareness services discusses services from online hosts, database producers and national libraries. The electronic journal, electronic documents and document delivery services are identified as factors which might influence the nature of future current awareness services.

Introduction

One of the products available from a computer-stored database is current awareness services. Any computer database which is updated regularly can be used as the basis of a current awareness service. This means that the sources from which current awareness services are derived are diverse, embracing both those producing current awareness services from private databases, and others producing similar services from publicly-available databases. This article focuses on current awareness services based on bibliographic databases, and attempts to draw together the various options for current awareness services, and to assess the future for such services. Attention is focused on the facilities offered by text retrieval packages in support of current awareness services. A review of the other options for current awareness services is also given. Very little has been written on the general function of current awareness recently, and most of the earlier sources (including for example references 1, 3, 4 and 6) focused primarily upon manual or non-computerised current awareness services.

Current awareness services are designed to keep the users of such services up to date and alert to the emergence of new information and documents in a subject area which is of interest to them in their work, education or leisure. Such services usually assume a general background knowledge of the area of interest on the part of their users, and draw attention to new developments. This is performed by offering the user notification or news of developments, at regular intervals. If the current awareness service is based on a bibliographic database, the notifications will be concerned with the new literature that has become available. Developments such as electronic mail and electronic journals, which offer a more direct route to current awareness, are considered later.

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There are essentially two different approaches to the packaging of current awareness services (with some intermediate options). It is possible to choose bulletins or selective dissemination of information (SDI). With bulletins all new records added in a specified broad subject area are made available to every user, typically in some printed form. This eliminates the need for careful pre-selection and direction of records, and offers the user the opportunity to browse, but on the other hand makes it incumbent upon the user that some time be spent selecting items of interest. The other approach, SDI, offers each user an individually-tailored set of records, which is appropriate to his particular requirements, and has been selected to match the profile specified by that user.

Both approaches can be derived from computer databases, but each imposes slightly different requirements for the formatting and display of the output.

Text retrieval packages and current awareness services

Many text retrieval packages, in common with well-known examples such as ASSASSIN and CAIRS, were originally designed as a means of replacing a manually-produced current awareness service, such as an abstracts bulletin. By the late 1960s, generating an abstract bulletin on a regular basis, perhaps weekly, and maintaining indexes to the literature covered by that current awareness service was becoming extremely time-consuming and thus expensive. It became apparent that computer-based solutions offered both a better service, with more flexibility and easier indexing and maintenance of the database in the longer term, coupled with lower costs. Thus current awareness services were one of the major reasons for contemplating the design and implementation of text retrieval systems.

Other text retrieval packages, notably many of the microcomputer-based packages have entered the market-place more recently, in the last three to four years, and do not have the same history of association with current awareness packages.

In analysing the text retrieval packages listed in[5], of the thirty-nine software packages considered, twenty reported that they had some facility which would support SDI. Such packages are normally used to maintain local databases, of, for example, company reports, or other literature of specific interest to an individual organisation or company. Therefore, the bibliographic current awareness services which are derived from these local databases will announce these types of documents, and can, in this sense be contrasted with the services covered in the section on other options for current awareness.

Microcomputer packages and SDI

A quick glance at Table 1 will suffice to demonstrate that the number of microcomputer-based packages which claim to offer any special facilities

TABLE 1. *Software packages supporting SDI*

	*Price Range**	*Supplier*
3RIP	£7,000 + p.a.	Paralog
ADLIB	£10,000–£29,500	LMR Computer Services
ASSASSIN 6	£31,950 (10yr lease)	ICI Plc Agricultural Division
BASIS	£12,000–£60,000	Battelle Software Products Centre
BRS/SEARCH	£4,400–£25,000	BRS
CAIRS	£1,400–£26,000	Leatherhead Food Research Association
DECO	£12,000	Unilever Computer Services
INFO-TEXT	£7,840–£20,000	Henco Software Inc
INMAGIC	£6,500–£16,500	Inmagic Inc
INQUIRE	£36,700–£142,400	Infodata Systems Inc
ORBIT	£45,000	SDC Information Services
QL/SEARCH	£49,000	QL Systems Ltd
STATUS	£12,000–£25,000	AERE
UNIDAS	–	Sperry Ltd
METALOGUE	£2,000–	Oriel Computer Services
AQUILA	£395	Kent Barlow Publications
CORMORANT	£500–£600	Kent Barlow Publications Ltd
EAGLE	£155	Kent Barlow Publications Ltd
INMAGIC-Micro	£420–£780	Inmagic Inc
SCIMATE	£300 approx	Institute for Scientific Information

*As of August 1984

for SDI is very limited. The main exceptions are those from Kent Barlow Publications and those which are microcomputer versions of packages for mini or mainframe computers. Yet, to a limited extent current awareness can be extracted from nearly every database.

Online SDI can always be extracted from a database merely by the user consulting the database at regular intervals and noting any new items. This is admittedly a very basic service, and may be inconvenient where a large number of users have to be served, and, furthermore, requires the user to sit at the microcomputer or terminal and perform a search on each occasion that he wishes to identify any new items.

A very basic facility which makes current awareness easier to gather, is the ability to select records according to the date which they were added to the database. This is available in various microcomputer packages, such as CARDBOX-PLUS from Caxton Software Ltd. This may simply be a

matter of being able to search on numeric strings and evaluate whether an accession number or date is greater than a pre-specified value. Thus it is possible to retrieve only those items which were added to the database since its contents were last viewed.

One step on from the identification of current records is the possibility of being able to store a permanent search profile, or preferably, several such profiles, so that the user can execute the same search profile on a later occasion. This facility is available in AQUILA, where SDI is supported by the FINDSAVE command in which each search strategy for each user is saved as a separate SDI search module. AQUILA also goes a little further, and permits automatic run through of a group of profiles, and produces a composite print-out which can then be split up. Both CORMORANT and EAGLE perform in a similar manner. INMAGIC-Micro also has the facility to hold search strategies and re-run them as and when required (for example, after database updates). Printed output is available, or the output can be loaded onto disk for subsequent processing by other software (such as software for word processing).

A further feature which supports effective current awareness is user-defined outputs. In METALOGUE, for example, the range of possible user-defined outputs includes print-outs, catalogue cards, input to word processors, frames for submission to viewdata, phototypesetting etc. These outputs can be produced in any sequence, and headings added. These facilities indicate the extent to which microcomputer-based software packages can be expected to support current awareness. Some (e.g. MICRO-QUERY) also have mailshot and letter-printing facilities which allow the storage and use of names and addresses.

The mainframe and minicomputer packages often offer more refined versions of these basic facilities, together with other facilities which constitute specialised support for running a large number of SDI profiles.

Mainframe and minicomputer packages

It is difficult to summarise and generalise about the facilities offered to support current awareness in the larger and more expensive packages for two reasons. One problem is the diversity of provision between individual packages. The second problem is related to the first. The facilities which support current awareness services are related to many features of the package. For example, an SDI search profile is framed in terms of the search logic and index terms that are available in the database. The availability of search facilities such as Boolean logic, weighted logic, the ability to search for synonymous or related terms, the ability to search on word stems, and on specified fields or word types are important for effective retrieval in current awareness, just as they are in a retrospective search. Another important general facility which will be used in, and affect an SDI service is the range of formats available for printed output. If headings and other formatting of text are available generally, then these can be exploited in the SDI service. Table 2 lists some of the main features of

TABLE 2. *Features of text retrieval packages which may influence SDI services*

1. Methods of inputting records (including formats for input screens).
2. Characteristics of the database e.g. number of files per system, number of records per file.
3. Indexing (including stop-lists, go-lists, indication of related and synonymous terms, indication of location of terms).
4. Search facilities (including logic operators, multiple terms, search commands, parentheses, transaction, searching on specified fields etc, saving searches, free-text searching, displaying the index).
5. Output facilities (including user-definable formats, sorting of records, indexes).

packages which may influence the character and effectiveness of a current awareness service. Although they have been excluded from this list, plainly basic features such as the machine on which the package runs, and the maintenance and support for the package can be important.

SDI output

There are a number of features of the output format of SDI which are worth reviewing. These include: the output modes, output format, and the output frequency. The selection available in each of these categories obviously influences the effectiveness of the service to the user. The possible output modes are:

1. to different types of printer e.g. local printers, remote printers and high-speed printers, to produce a print-out;
2. to disk for subsequent processing by other software, for example, for word processing and typesetting;
3. to screen (online current awareness);
4. to other computers via a network.

As far as the end-user is concerned SDI output will finally be presented to him or her in one of two forms: online (for viewing at a terminal) or printed; both have a role, and their own adherents. Online SDI can be viewed whenever the user chooses, and has some inherent flexibility. Nevertheless printed output does provide the user with a printed record of notifications to take with him or her to retrieve documents, and does relieve the user of the necessity of making use of or having access to a terminal.

The output format may be pre-determined or under the users control. Some packages offer special facilities for formatting of output. For example, in CAIRS each SDI print-out has a header page with the facility for a logo.

The output frequency (e.g. monthly, weekly, irregularly) may be controlled by operator or programmer.

Some packages offer additional facilities. It is useful if SDI profiles can be stored with sequential identifiers so that a group of searches may be performed together. On some of the larger systems, profiles can be stored and run on alternative databases.

Other options for current awareness

Although many of the larger industrial and other special libraries create their own databases, and generate current awareness services from those databases, there are other options for obtaining current awareness services. Local databases may relate entirely to local documents e.g. internal reports, correspondence, records, etc., but others may include information and bibliographic references which are publicly available. Where the database contains publicly available information, the records, especially if they are bibliographic records may be created by the information service concerned, or may be derived from other externally available databases, either by lease or purchase of magnetic tapes, or by downloading from one of the databases accessible through one of the online hosts.

SDI is also available in various formats from the large database producers and suppliers. For example the Institute for Scientific Information offers ASCA, and the Institution of Electrical Engineers markets INSPEC SDI. Many database producers also offer variations on individual SDI, such as standard profile or topics services. These pre-set profiles are based on a series of standard topics or subjects. Some examples are: Topics from the Institution of Electrical Engineers, and ASCA Topics from the Institute for Scientific Information. *MICRO/B-I-T-S* and *MACRO/B-I-T-S* are relatively new services from Biosciences Information Services which are produced on disk rather than in a printed form. Other current awareness services from database producers are the various more traditional printed product such as abstracting and indexing journals, and selective listings such as INSPEC's *Key Abstracts*.

Another important source of current awareness services is the online hosts. An SDI facility has been introduced by most of the major hosts over the past few years. Dialog, Orbit and Pergamon-Infoline all offer this facility. As with a local database, SDI can obviously be gleaned by a diligent user re-running a search profile at intervals in order to check whether any new items have been added to the database. Most hosts offer a command which permits profiles to be saved, and some offer a special facility for SDI which permits a profile saved as an SDI profile to be run every time that the database is updated. If the profile contains a command to create offline prints, then, a set of offline prints will be created each time that the profile is run against a new batch of records, and this set is dispatched to the user. This facility is often available for many of the databases that are mounted by any given online host, but not for all of them.

For example, the SDI service offered by Dialog permits search profiles to be stored permanently by use of the END/SDI command. Output can be received by the user at his convenience. The routine running of search profiles is available on 47 of Dialog's files. Notifications can be printed by incorporating a PRINT command into the SDI profiles.

National libraries are a further source of SDI service. The CAN/SDI (Canadian Selective Dissemination of Information) service is a particularly noteworth example. CAN/SDI is a national SDI service based on around twenty databases including *COMPENDEX, CHEMICAL TITLES, ERIC, FSTA, INIS, INSPEC, MARC, MEDLINE, SCI* and *TOXLINE.* CAN/SDI is operated and maintained by CISTI, the Canadian Institute for Scientific and Technical Information, in co-operation with five other CAN/SDI centres. Subscribers are located in industry, universities, government, hospitals and research establishments, in Canada and elsewhere. The British Library has responsibility for an SDI service derived from the *MEDLARS* database, to which they provide input. The database is co-ordinated and marketed by the US National Library of Medicine.

In order to complete the picture, it is important to remember that bibliographic current awareness services are only part of the global process of keeping alert to new ideas, policies and happenings. In some areas, news media such as television, radio, newspapers and magazines are also important. In other areas particularly heavy use is made of telephone, written and verbal exchange with colleagues and other experts and agencies.

The future for current awareness services

Plainly, it will always be necessary for people to be kept alert to new developments in their work, education and leisure interests. The priority attached to being up to date may vary from time to time, and the mechanisms adopted for remaining alive to developments may change. Bibliographic current awareness services are dependent upon documents being researched, written and published. The nature of bibliographic current awareness services is influenced by the nature of the documents whose presence they announce. Hence, any reassessment of the process that leads to the publication of documents may influence the market for, and the nature of current awareness services. So, the switch to the electronic document poses interesting dilemmas for current awareness provision.

One particular development is the electronic journal. The electronic journal is in itself a mechanism for current awareness. The electronic journal makes use of telecommunications networks and computer storage to enable scientists and others to interact and communicate research findings and other new ideas. Formulated, so far, primarily in the area of science, with an electronic journal scientists are able to input ideas and text into a computer database for their colleagues to view, and, conversely,



they are able to view the work of others. There are various possible modes of operation for such a journal. These include:

- an enquiry-answering system between experts;
- a bulletin;
- an annotated abstracts journal;
- discussion and questions on papers;
- a poster papers journal;
- a refereed papers journal.

Two major projects in this area have so far been conducted. The first electronic journal was established on the EIES (Electronic Information Exchange System) network from 1976 to 1980, and the later experiment, the BLEND (Birmingham Loughborough electronic network development) project started in 1980. Which of the above modes for an electronic journal will eventually emerge, or whether different journals will function in different ways still remains to be seen. Obviously, the implications for bibliographic current awareness services will be very different depending upon which of the possible roles for the future electronic journal eventually predominates. Another aspect of the topic of the electronic journal to be explored is the impact that a good number of electronic journals might have on printed journals and other documents. Certainly, whilst it is difficult to predict future developments, the electronic journal represents a very different approach to current awareness. It also serves as a reminder that, especially with the widening availability of computer databases, it is possible to link a current awareness service much more closely with the original documents and information that it announces, than is the case in many bibliographic current awareness services today. A series of successful electronic journals would also herald the acceptance of online current awareness in the form of the electronic journal, and subsequently, for other current awareness services. Currently, many users still prefer printed notifications, but their preferences may be eroded and online SDI may take over. Should this happen, then those suppliers best equipped to offer an SDI service through a telecommunications network that can cheaply and easily be linked to a large number of terminals will be in a strong position in the market-place.

Whilst bibliographic current awareness services focus on announcing the contents of periodicals, other documents, such as reports, conference proceedings, and monographs are frequently also covered. The spread of the electronic document in this sector certainly has implications for current awareness services. Where, for instance, a directory is available in electronic form this permits the data to be kept up to date on a regular basis. If all sources are updated regularly, there is no need to announce the publication of new documents in a current awareness service. All that is necessary is a complete and up-to-date list, fully indexed, of the electronic document sources. Current awareness services are nearly eliminated.

Another technological development which stands to make an impression in the environment in which current awareness suppliers operate is the

progress in the area of electronic document delivery. If the existence of a document can be notified and discovered by consulting a print-out from an online SDI service and then, immediately ordered and received, the current awareness service has a much more immediate impact. Such an opportunity for immediate retrieval of the documents could make current awareness services much more attractive to many users. Thus, the up-to-date index, which points users in the direction of new documents could eliminate much of the need for browsing, and permit people to receive current documents almost as soon as they are published, providing always, that there is no time lag in the inclusion of records of documents in the database! Online document delivery will also make online SDI particularly attractive. The convenience gap between printed SDI, and the associated document acquisition, and online SDI coupled with online document ordering will be wide. Online SDI is likely to become more popular than printed SDI, and those suppliers who are in a position to couple online SDI with online document ordering and delivery are likely to predominate the market-place – provided their price is right.

Current awareness services, then, are likely to be influenced by the move towards electronic documents in various ways. The speed with which change will come is difficult to predict, and is likely to be faster in some areas than in others. It will be interesting to watch developments in this well established sector of information services.

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TOOLS for the TRADE

Translating and the Computer 5

Edited by
VERONICA LAWSON

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Current awareness in education: an evaluation of Trent Polytechnic's *Education News*

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Education News is one of several information bulletins produced by the library at Trent Polytechnic. It contains references to articles in newspapers and journals on topics of interest in further education, higher education, and adult education. DES (Department of Education and Science) press releases are also included. About fifty copies of the bulletin are produced fortnightly. It is intended as a current awareness service for senior people in the Polytechnic administration and the departments, but it goes to people outside the Polytechnic as well, and half the recipients are librarians or information officers involved in some way with education.

The bulletin is compiled from an education librarian's scanning of library materials at the Polytechnic. Items are also taken directly from the bulletin produced at Hatfield Polytechnic, and this has the effect of reducing the amount of scanning that needs to be done at Trent. References are keyboarded into a computer at convenient times, each reference having subject headings added from the *Coombe Lodge Educational Thesaurus*, 1978 Edition, and additional keywords which describe aspects of the article in more depth. Each fortnight a print-out is obtained of the input material, sorted into alphabetical order of the rotated subject headings, so that a single item may occur several times in an issue. At present the print-out is photocopied doublesided onto A4 sheets, and a cover is added. Figure 1 shows a page from the bulletin. As a back-up to the bulletin a photocopy service is offered, and also the bulletin references are accumulated to form a database which can be used for retrospective searches.

The purpose of the evaluation was twofold: to help answer a question from the chief executive at the Polytechnic about value for money, and separately to investigate the effectiveness of the bulletin from the client's point of view, at a time when a change in bulletin compilation was envisaged.

Cost and benefit comparison

For justification purposes the cost of the bulletin was calculated and compared with estimates of its value to those who receive the bulletin and make some use of it. The costs used in a cost-benefit comparison are

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traditionally the avoidable costs – the costs that would not be incurred if the service were not provided[1]. Hence the costs of scanning and keyboarding for the bulletin were included, but not the costs of the library materials scanned, since they would be purchased whether or not the bulletin was produced. On the other hand the costs of supplying photocopies of items seen in the bulletin by its readers were included, since if the bulletin was not provided, these specific costs would be avoided. Details of the costing are given in Table 1. The total avoidable cost of the bulletin was £1,559 per annum. Fifty copies are produced each fortnight, so the bulletin cost is £1.24 per copy, or £31 per annum per copy.

A value for *Education News* was estimated in a number of different ways, described in detail below. The aim was to collect information on value from all bulletin recipients who made use of the bulletin. By interviewing each and every user of the bulletin a more convincing demonstration of value would be obtained, it was reasoned, and non-users of the bulletin would scarcely be able to supply any information about its value. It was not easy to discover which of the recipients of the bulletin

TABLE 1. *Details of costing for* Education News.

The activities involved are scanning, keyboarding the references, and copying, collation and distribution. The cost of the photocopy service which results from the bulletin is included, as an avoidable cost.

Scanning	*Cost (£)*
Labour cost: 1,375 min per annum @ £7,650	105.00
Materials cost: one copy of *HERTIS*	10.50
	115.50
Keyboarding	
Labour cost: 1,0479 min per annum @ £7,650	802.00
	802.00
Copying/collation/distribution	
Labour cost: 7,909 min per annum @ £4,960	392.00
Materials cost: 1,250 covers per annum @ £27.50 per 2,000	17.00
1,820 sheets copy paper per annum @ £1.50 per 500	5.00
	414.00
Photocopying in response to bulletin	
Labour cost: 4,500 min per annum @ £4,960	223.00
Materials cost: 1,500 sheets copy paper per annum @ £1.50 per 500	4.50
	227.50
TOTAL COST OF THE BULLETIN SERVICE	1,559.00

actually made use of it, but eventually twenty-nine of the thirty-three suspected users of *Education News* were interviewed. The procedure adopted and the interview schedule are given in the appendices.

The alternative cost of keeping up with the literature

Clients who admitted to reading their copy of *Education News* were asked, 'if you did not have the bulletin, how would you go about keeping up with new material on the topics it covers?' Clients were encouraged to answer in terms of the time they would spend. This seemed a more realistic exercise for the client, who was obliged to admit that s/he would put time aside to make up for loss of the bulletin – an answer in terms of what papers and journals would be sought out and scanned gives perhaps a less convincing nod from the client to the bulletin's value (it is also less easy for the investigator to add up). The alternative cost to the client of keeping up with new material was converted into cash via the salary. An analysis of responses is given in Table 2. Nine bulletin readers would spend a total of £6,549 per annum on keeping themselves up to date in the absence of the bulletin. Many clients admitted that the bulletin was a bonus ('it's like the nine o'clock news') and said they would do no extra scanning to replace it. On the other hand the alternative cost of £6,549 does not account for the value of *Education News* to clients like 12, 25, 39 and 46 (See Table 2), who obviously value it as an input to their knowledge of what is published, but who would never find the time to increase their scanning of the literature.

The alternative cost of a purchased bulletin[2]

All clients were asked to say how much they imagined *Education News* would cost if it was available from a commercial source, like a professional institute or the producer of a database on education. Offers from eighteen clients are tabulated below.

Cost per annum (£)	5	6	12	15	20	25	40	50	75	100	120	375	1000
Number of offers	1	1	1	1	1	2	1	3	2	2	1	1	1

Clients found the question difficult to answer. Some tried to find something with which to compare *Education News*. Others wanted to know the cost of production and the circulation of this hypothetical periodical. The mean cost was £125 per annum, the mode £50, the median £40. (Actual cost £31 per annum.)

FIGURE 1. *Page from* Education News.

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.....
INDUSTRY:COMPUTERS:FINANCE:UNIVERSITIES

TURNEY,J.
TEAMS SEEK BETTER RELATIONS (ON REPORT
SAYING UNIVS NEED INDUSTRIAL PATRONS TO
HELP FUNDING APPLICATIONS FOR GOVT'S
COMPUTER RESEARCH PROG)
THES. P1                                        26031
Aug-19-1983

.....
LAW:LECTURERS
BAR.

FLATHER,P.
LECTURERS STAND UP AGAINST LIMIT TO BAR
THES. P4                                        26053
Aug-19-1983

.....
LECTURERS:LAW
BAR.

FLATHER,P.
LECTURERS STAND UP AGAINST LIMIT TO BAR
THES. P4                                        26053
Aug-19-1983

.....
LECTURERS:STAFF DEVELOPMENT
LOUGHBOROUGH UNIV.NOTTM UNIV.

O'LEARY,J.
LECTURERS URGED TO POLISH UP THEIR
STYLES OF ADDRESS (I.E. PRESENTATION OF
LECTURES)
THES. P1                                        26058
Aug-12-1983

.....
LIBRARIES:EDUCATION:BOOKS
NATIONAL BOOK LEAGUE.NBL.

NORMAN,M.
EDUCATION CRISES FEARS OVER RISING COST
OF BOOKS (ON A REPORT FROM THE NATIONAL
BOOK LEAGUE)
DAILY TELEGRAPH. P11                            26022
Aug-15-1983
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TABLE 2. *Alternative cost to readers of the bulletin to keep up by their own efforts.*

Known scanners of the bulletin were asked how, in the absence of the bulletin, they would keep up with new material in their areas of interest. The cost of the extra time they would spend in scanning newspapers and journals, and the cost of purchase (if they said they would buy their own copies) was calculated. The cost of time spent scanning was at the salary rate, without overheads.

	Cost (per annum) (£)
1. Buy and read *TES* etc; spend 3 hrs/wk on YTS material.	1,467
2. Look at *Higher Education Abstracts* (15 min/wk).	118
3. I would not; the bulletin is a bonus.	
4. This is additional to my professional reading – it's a bonus.	
5. Go to the library each Friday, and to the staff library at the University; spend 2 hrs/wk skimming only.	473
7. Buy *TES, NATFE Journal*, go once a month to both libraries, browse for 3/4 hrs, get copies of relevant material and read them later.	165
8. Would try to keep up, haphazardly, when I went to the library (30 min/wk).	274
9. I read *TES, Education* already; would probably do no extra. A large amount is duplicating what I do anyway, or if it isn't it's rather peripheral.	
10. Would go through the journals in the library by hand, and also go into the BL database – with a list of names only; 4 hrs scanning per week.	947
11. I would have to go through the journals; 4 hrs per week.	1,889
12. Would not have time to do all this scanning.	
13. It saves me time; 2 hrs/wk scanning.	1,099
25. I would look at what I buy already. I would miss things, but I have no time to sit in libraries, and I'm not even near a library.	
26. I would do no scanning myself.	
27. I would not.	
28. Would read the *Guardian* and a journal (30 min/wk).	116
29. Would just scan the journals we take ourselves.	
31. It's used as a check-up on existing scanning; I would do no extra.	
32. I would look at *HERTIS bulletin*. I would not feel the gap.	
33. No extra work.	
39. As I did before – look at the newspapers; some things I just would not see.	
46. Its useful in showing me material I haven't got; no extra.	
TOTAL ADMITTED ALTERNATIVE COST PER ANNUM	6,549

The alternative cost of £6,549 does *not* account for the value of *Education News* to clients like 12, 25 etc., who obviously value it as an input to their knowledge of what is published, but just would not have the time to increase their scanning in its absence.

BL = British Library
TES = Times Educational Supplement
YTS = Youth Training Scheme

TABLE 3. *Time that users of* Education News *spend on processing their copy.*

Time spent on the bulletin per annum was calculated from admitted time spent scanning, time spent processing items from the bulletin (librarians) and time spent reading the copies that were ordered from the photocopy service at 5 min per item.

In a few cases it was suspected that clients who said they scanned the bulletin did not, in fact do so. No calculation was made in these cases.

		Cost (per annum)
1. 28 min/copy	118 photocopies per annum	203.00
2. 14 min/copy	1 photocopy	55.10
3. 18 min/copy	110 photocopies per annum	126.50
4. 12 min/copy	15 photocopies per annum	72.70
5. 10 min/copy	60 min per issue in processing time	98.70
7. 7 min/copy	17 photocopies per annum	34.90
8. 10 min/copy	1 photocopy per annum	45.80
9. 5 min/copy	for about half of them 3 photocopies per annum	14.50
10. 10 min/copy	3 photocopies	19.70
11. 20 min/copy	7 photocopies	84.20
12. 20 min/copy	29 photocopies	155.60
13. 15 min/copy		68.70
14. 7 min/copy		32.10
18. 10 min/copy		45.80
21. 10 min/copy		39.30
24. 15 min/copy	16 photocopies	26.00
25. 15 min/copy	35 photocopies	44.70
10 min/copy	(Two users of a circulated copy @ Broxtowe)	42.70
15 min/copy		39.40
26. 10 min/copy		19.70
27. 12 min/copy		23.70
29. 9 min/copy	10 min processing time per issue	37.50
30. 15 min/copy	144 copies @ 6 min processing time/copy	97.80
31. 15 min/copy		29.60
32. 10 min/copy		19.70
33. 10 min/copy		29.00
34.	10 min processing time/issue	19.70
39. 7 min/copy		13.80
40. 10 min/copy		19.70
46. 10 min/copy	6 copies @ 10 min processing time/copy	37.90
	TOTAL ADMITTED TIME SPENT USING THE BULLETIN PER ANNUM	1,597.00

What clients would pay for their copy of *Education News*[3]
Clients who said they read the bulletin were asked what was the most they would pay for their regular copy if they had to buy it from their department funds (thus having less to spend on other provisions). Offers from twenty-three clients are tabulated below.

Prepared to pay (£)	0	10	12.50	15	20	25	30	50	60	120
Number of offers	2	4	2	1	3	1	4	4	1	1

Twenty-three clients would pay a total of £665 for the bulletin. (Cost of the bulletin for 23 clients £713 per annum.) The mean offer was £31.70 per annum, the median £25 per annum.

Clients' time spent in making use of the service[4]
Users of a service could be said to value that service in proportion to the amount of their time they are habitually willing to spend in making use of it. Clients who admitted to using the bulletin were questioned as to the sort of use made of it, and the time spent on each type of use. This included time spent indexing or filing items from the bulletin, and also time spent reading photocopies of articles seen in the bulletin. In order to obtain a cash value to compare with bulletin cost, these times were converted to cash at the client's salary rate (Table 3). Thirty clients spent time to a total value of £1,597 per annum on making use of the bulletin service. (Cost of the service was £1,559 per annum.)

Items from the bulletin which were useful to the client
Clients who read the bulletin in order to pick up items for their own use (as opposed to acting as agents for others) were asked to recall any items which they had seen in the bulletin, read, and which had been useful to them in connection with their work. Ten users of *Education News* were able to recall such items, and to explain how they had been useful. None felt able to put a cash value on the benefit to their work from knowing about the item. However the question proved to be a useful one in justifying the bulletin, because of the different ways in which clients can be seen to benefit from the contact with the current literature which it provides. A summary of these is given below:

(1) evidence which was used in discussions inside and outside the Polytechnic; adds to the advice I can give the students;
(2) provided a model for analysis of the use of academics' time which helped me;

(3) facts useful for argument at a conference; enabled me to see how the wind is blowing; helped me with the questions that are fired at me; enabled me to understand the different points of view on an issue;
(4) provided the latest information on a changing topic; the information had some effect on my attitude; information which was useful when we reorganised our course;
(5) an article completely changed the direction of the work we were doing; (I would never have seen it without the bulletin); information that was authoritative, and explained ideas usefully;
(6) an article on vocational training was used in the course; we were able to identify the sort of people we wanted to speak on the course;
(7) an article on the student's perception of the role of a supervisor was most useful to me;
(8) ideas on recruiting students; projections for the future which helped;
(9) ideas to confirm or alter one's thinking, for example on YTS (Youth Training Scheme);
(10) an article which helped with value judgements; a starting point for my paper at a conference; help in reinforming my personal views on an issue.

Cash value of the contribution made by the bulletin to clients' work[5]

Clients who read the bulletin were asked to say what was the annual cash value of the contribution that the bulletin made to their work. On the whole this question did not, as was intended, make the respondents think about the value of useful information obtained via their bulletin reading. Instead, five clients offered the alternative cost to them of doing their own scanning of current literature. One client offered £2.5 million if a contract under negotiation was obtained. Many clients felt unable to answer the question.

The librarian's report to the director presented cost and value information in much the same way as they are presented here. The outcome was that the director was satisfied that some staff were benefiting from *Education News* at a justifiable cost, and more importantly perhaps, that the librarian knew what he was doing.

Table 4 shows a comparison of responses to the six approaches to valuation for fourteen direct users of *Education News*. In column two is noted any response to question 2a (Appendix B) about good features of the bulletin. Although it is difficult to pick out a single discriminating method for value, it will be seen that the separate approaches do support each other in suggesting that about half the clients value the service significantly more than the remainder.

TABLE 4. *Responses to questions based on the seven alternative approaches to value (from fourteen direct users of* Education News).

No.	*Time spent on bulletin*	*Good points mentioned*	*Cost of commercial alternative (£)*	*How client would keep up*	*Amount prepared to pay (£)*	*Items put to use*	*Annual value (£)*
1	*28 min*	*up to date*	15	*Do some*	*50*	*4*	*
2	14 min	–	2	Read abstracts	–	*1*	–
3	*20 min*	*Saves time*	3	Not	10	*4*	
4	12 min	*Saves time*	?	Not	*50*	*3*	–
5	10 min	*Wide cover*	1,000	Do 2 hrs/week	–	*1*	*
6	2 min	–	–	Not	25	–	–
7	7 min	*Saves time*	*120*	Do 1½ hrs/week	*120*	*3*	*
8	10 min	*Saves time Brings ideas*	12·50	*Some*	12·50	*1*	12·50
9	5 min	–	–	Not	*50*	–	–
10	10 min	*Saves time*	*20*	*Do 4 hrs/week*	*50*	N/A	*
11	*20 min*	*Extends awareness*	*100*	*Do 4 hrs/week*	20	*1*	*
12	*20 min*	–	?	*No time*	*30*	*2*	–
13	*15 min*	*Saves time*	12·50	Not	*30*	*3*	*
14	7 min	–	10	Not	–	–	–

* Indicates the annual alternative cost of *Education News*

Effectiveness of the bulletin service

At a time when changes in the production of *Education News* were being contemplated, the librarian wanted to know whether the bulletin in its present form was doing its job effectively – giving useful notifications with a minimum cost to the client in time and frustration. Clients' comments were sought on aspects of production and content which were seen to be related to this requirement:

(1) *Coverage*
coverage of topics (2a);
types of material scanned (2a);

(2) *Timeliness*
age of bulletin items when they appeared (2a);
items already seen by the client (Trial);

(3) *Relevance*
items that should have been included (2c);
type of item selected (2a);

(4) *Ease of use*
How clients scan an issue of the bulletin (1b);
arrangement of the bulletin (2a);
bulletin format (2a);
amount of description given with each item (2a);

(5) *Reading load*
frequency of issues (2a);
number of items per issue (2a);

The numbers refer to questions from the interview schedule (see Appendix B).

Clients were first of all asked to name what they felt were the good and bad features of the bulletin from their own point of view[6], then the interviewer went through a check list of features in order to obtain their comments on each of the aspects listed above. It was thought that the first question would reveal problems with bulletin use which were uppermost in the client's mind, and this proved to be the case. The unprompted comments, in order of importance, were as follows:

- repetition of the same item under different subject headings;
- page format was not liked;
- headings did not stand out;
- reproduction was poor.

Clients' comments in response to a prompt on aspects of the bulletin related to its effectiveness are summarised below.

Coverage of the bulletin

Coverage of topics
Two clients would have liked a statement as to exactly which topics within education were covered by the bulletin. Several clients wanted extra topics to be included. Some of them were on the look-out for material on subject teaching, counselling, and assessment – topics which fell outside the present coverage of the bulletin. Material on topics already covered, but concerning experience from countries other than the United Kingdom, was requested by two readers.

Types of material scanned
In addition to newspapers and journals, it was suggested that the following should be scanned for the bulletin: policy statements by pressure groups, anything from the DES and from similar sources, book reviews, and more of the scholarly type of publication.

Timeliness of the bulletin

Age of items
Three clients had noticed some items older than two weeks appearing in an issue of the bulletin, but none of them felt that this was a disadvantage. Seven respondents indicated that they were not concerned about the age of items in the bulletin.

Items seen already
Clients were asked to read through a few trial bulletins (see Appendix A) and mark those items which they had seen before. The responses mostly

indicated that clients scanned the newspapers, but not all the papers! One or two senior executives were provided with a cuttings service by the library, and this meant that they had already seen some of the items keyboarded for the bulletin.

Relevance of items in the bulletin

Relevant items seen
Clients who agreed to read through a few trial bulletins were asked to mark items which they recognised as being related to their interests. Eleven respondents found between one and ten relevant items in the bulletins they scanned for the trial. Two found between eleven and twenty relevant items, and a further three clients found between twenty-one and thirty items.

Items that should have been included
Clients were asked, 'Have you recently found any material of interest to you which you felt should have been mentioned in the bulletin?' Only two items were mentioned by readers of the bulletin. A third client said that since the topics covered in *Education News* were not on his list of main interests, he did not go out of his way to seek articles on them.

The sort of item selected for inclusion
About one third of respondents were less interested in journalistic items than in more serious, reasoned, journal-type articles. 'Articles from the papers can be overtaken tomorrow. They are totally different from a journal paper which is more carefully presented, and leads to more references'. 'Some of the items are people's opinions – I read the primary documents'.

Ease of use of the bulletin

How clients read the bulletin
Clients were asked to describe exactly how they went about looking through their issues of the bulletin. Nineteen out of twenty-eight respondents look through the bulletin from end to end. Seven clients looked for subject headings related to their interests – five of these were librarians. Four direct users looked for the titles of newspapers or journals known to them. Four users merely glanced through their copy.

Arrangement of the bulletin
Fourteen clients did not like the repetition of items under different subject headings. Most clients looked at every item when going through a copy of the bulletin, and after a while they saw items for the second or third time. Some clients mentioned that they checked back to convince themselves of this. One result is that clients tend to give up when they are about two thirds of the way through the bulletin – this is obvious from the marking of the trial issues.

FIGURE 2. Education News *revised page format.*

```
HIGHER EDUCATION
     WHITE ELEPHANTS (ON THE GOVERNMENT,S WHITE PAPERS)
     EDITORIAL
     THES. P32
     24-Feb-1984
     HIGHER EDUCATION
                                                              37041

HUMANITIES EDUCATION
     MUSIC INQUIRY TO BE SET UP (ON POSSIBLE CONSERVATOIRE MUSIC
     COURSES IN THE U.K.)
     ANON
     THES. P7
      2-Mar-1984
     MUSIC
                                                              37044

INDUSTRIAL TRAINING
     PICKUP--HELPING EDUCATION HELP INDUSTRY
     ELLIDGE,N.
     TRAINING OFFICER,20(3). P80-82
      1-Mar-1984
     INDUSTRIAL TRAINING:RETRAINING
     PICKUP.FEU.                                              37208

INDUSTRIAL TRAINING
     THE EMPLOYER,S VIEW (OF TRAINING AND RETRAINING)
     PAIGE,V.G.
     BACIE JOURNAL,39(1). P26-27
      1-Jan-1984
     VOCATIONAL TRAINING:RETRAINING
     NTI.CBI.YTS.MSC.DES.TVEI.                                37217

INDUSTRIAL TRAINING
     TRAINING METHODS-FADS AND FANCIES? (THE SIMPLE PRINCIPLES TH
     AT FORM THE BASIS OF ALL SOUND TRAINING)
     HUCZYNSKI,A.
     BACIE JOURNAL,39(2). P71-72
      1-Mar-1984
     TRAINING
                                                              37204

INDUSTRIAL TRAINING
     WHY DO YOU NOT EVALUATE? (THE IMPORTANCE OF IMPROVING EVALUA
     TION METHODS FOR EFFECTIVENESS OF TRAINING)
     BRAMLEY,P.
     BACIE JOURNAL,39(2). P74-75
      1-Mar-1984
     TRAINING:EVALUATION
                                                              37205
```

There were a number of comments on the subject headings themselves. It was not clear what they contained, some were very broad, they were useful to extend the information contained in the title of an item. Another comment was 'I do not trust "sections" made by other people'. A separate list of headings was suggested.

Amount of description given with each item
Eleven clients wanted more description with each bulletin item. Six of these were direct users. One respondent said, 'Sometimes I am not sure whether I have seen a bulletin item during my own scanning – a synopsis would help'. Another remarked that for him cryptic titles – written to be eye-catching rather than informative – inhibited action. Several clients had to obtain an article sometimes in order to see whether it was relevant. (This problem was illustrated among the responses to the trial bulletin scanning exercise.) A short abstract would be useful, saying whether the item made a statement, and what angle it took. Did the article mention a person, a committee, a body, or a company?

Bulletin format
Sixteen of the respondents commented adversely on the format of the bulletin. Seven disliked the general impression – 'crude', 'unattractive', 'computer print-out', 'could be more stimulating (welcoming)', 'looks like photocopied catalogue entries'. Nine thought that the identification of the parts of each reference could be clearer – 'the headings do not grab your attention', 'it's not easy to distinguish between the parts of each item', and 'it's the title that tells me the content, but where *is* the title'.

The reading load for the client

Frequency of issues
Only four clients found the bulletin to be too frequent. Two others remarked that it was frequent enough.

Number of items per issue
Six people altogether commented on the length of the bulletin. Two of these said that it would be better if items were not repeated under different headings.

The following recommendations were made for improving the effectiveness of *Education News:*

(1) If the subject coverage were to be extended, then it should be firstly to cover articles on the teaching of specific subjects.

(2) Clients would prefer more serious, reasoned articles to be included as references in the bulletin. There is the fact that clients see newspaper articles during their own reading, but it seems that they also value them less than articles from journals.

(3) The arrangement of items does not suit the scanning habits of the majority of bulletin users, who go through it from end to end, looking at



each item. In fact they find the arrangement of the same item under different subject headings to be a disadvantage. A once-only list with a separate index would probably suit all users, and save up to half the copying cost of bulletin preparation.

(4) Where titles are not informative, it is suggested that one or two lines of explanation be added, if this is not done already.

(5) The appearance and layout of the bulletin page should be improved if this is possible within the system adopted for production of bulletin and database from the same keyboarding. It should be clear which is subject heading, and which is title.

As a result of reading the report on effectiveness, of which the above is a detailed summary, the librarian responsible for *Education News* put in hand the following changes:

- more 'serious' titles to be scanned for the bulletin;
- single entry of each bulletin item, under one heading;
- clear separation of subject heading, title and added keywords;
- the hundred most-used headings to be listed in the bulletin;
- more descriptive comments to be added to items.

A page from the revised format is shown in Figure 2.

ACKNOWLEDGEMENT

My thanks are due to David Bagley, Librarian at Trent Polytechnic, and John Makin, Education Librarian, for their help and encouragement.

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Appendix A. Method of conducting the evaluation.

The first approach was by means of a note from the librarian to all recipients, which was sent with a copy of *Education News* in July 1983. The note asked clients to examine and mark up three copies of the bulletin, and return them to the library. Clients were asked to mark separately items which caught their eye:

- which were related to one of their interests;
- which might be related, but about which they could not be certain from the available reference;
- which they felt they might need to refer to in the future;
- of which they would like a photocopy;
- which they had already seen through their own reading.

Clients were asked to note how long it took them to scan each bulletin. Sixteen out of forty-nine recipients returned one or more trial copies over the next six months. Interviews were arranged with these respondents.

Interviews were arranged with a further five recipients of the bulletin who, although they had not returned trial copies, were known from their photocopy requests to be regular users. At this point brief questionnaires were sent to all remaining bulletin recipients in an attempt to establish whether or not they made use of the bulletin. This resulted in eight more interviews. Of thirty-three suspected users of the bulletin, twenty-nine in all were interviewed.

Appendix B. Checklist for client interviews (to follow the trial in which the client has read and marked some bulletins).

1. *Your use of the bulletin*
   (a) How do you use the bulletin? (Scan it, circulate it, file it, send for copies of items, extract and index it, read and file or index copies). How long does it take? Do you receive any other bulletins?
   (b) Exactly how do you scan the bulletin? (Look for subject headings, look at every item, look at titles, authors, items from particular publications, read the whole thing through).

2. *How you see the bulletin* (for clients who have actually scanned it at some time)
   (a) From your point of view, what are the good and bad things about the bulletin? (frequency, number of items it contains, age of the items, the coverage of topics given, the sort of item selected, the amount of description given with each item, the types of material included, the arrangement, the page format).
   (b) How much do you think *Education News* would cost to buy from a commercial source, like a professional institution or the producer of a database on education?
   (c) Have you recently found any material of interest to you, which you felt should have been mentioned in the bulletin? What material?

3. *Its value to you*
   (a) If you did not have the bulletin, how would you go about keeping up with new material on the topics it covers?
   (b) If you had to buy this bulletin with money from your section or department funds, (thus having less to spend on other things) what is the most you would be prepared to pay for it?

(c) Can you recall any items which you have seen in the bulletin, read, and which have been useful to you in connection with your work? How were they useful?
(d) Can you put a cash value on the contribution made to your work?
(e) What would you say is the annual cash value of the contribution that the information bulletin makes to your work?

4.
(a) If the client has put a 'C' against any items in the trial copies, ask why. (Related? Can't tell if related?)
(b) If the client has market 'X' against any items, remind the client about the database.
(c) Explain about the availability of back searches on the database.

C = Photocopy please
X = For possible use in the future

User-survey of an international library – resource allocation: preferred allocations of the library budget

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In a previous paper[1] we have attempted to describe the potential value of measuring how users perceive the library, and we have shown how segments of the user population could be defined by a perceptual criterion. This paper is an attempt to describe progress in the research on both quantitative and qualitative levels: we attempt to describe measurements of preferences in collection, resources and services developments of those segments of the user-group. We attempt also to signal correlations of these expressed preferences in terms of perceptions previously indicated.

Introduction

At the end of the questionnaire we asked the respondents to perform a budget reallocation. It appeared to be a logical step to continue with resource allocation according to needs and preferences subsequent to an analysis of measures of user-perceptions. We argued that assessment of behavioural characteristics is followed by the attempt to translate definable and evaluated preferences into tangible and quantifiable terms. By asking the respondents to perform a budget reallocation, we asked them to quantify their preferences by putting budgetary figures to their needs.

Objectives

The overall objective of the survey is to evaluate library services as perceived by its two main user-groups with the intention of translating such results as emerge into indicators and directions for future policy. This operation is to be performed in four major stages:

(1) data collection and analysis of usage; evaluations and preferences of first group (split into 2);
(2) data collection and analysis of usage perceptions; evaluations and preferences of second group;
(3) analysis/reconciliation of findings; submission to policy-forming body;
(4) policy analysis – shifts of emphasis in collection development and services; quantitative and qualitative recommendations.

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The framework and scope of this paper deals with the evaluative, preference and resource allocation aspects of Stage 1.

Hypotheses

We originally postulated that:

(1) Overall reform and modernisation were necessary in terms of expanded services and new systems;
(2) 'Nationality' was a significant determinant of library usage (information-seeking and retrieval habits) and of library evaluations.

It is in relation to these hypotheses that we wished to assess respondents' translation of former evaluations into resource allocation – a quantified statement of preferences and/or improvements as they saw them.

We asked the respondents how they would spend their budget – how they would apportion resources given that they had already analysed their own needs in terms of service improvement and collection development. They were also given a clear (hypothetical but not inaccurate) picture on how financial resources were currently allocated. Here it must be stated that this budget question was limited to 'spending power' and excluded salaries, staff-time, and operating overheads. (See Appendix 1 – question on budget reallocation); we were seeking to measure:

(a) if needs could be defined – in terms of collection development – by adding new items to the budget, and if this would engender a reallocation of resources;
(b) if the 'Nationality' factor continued to be a determinant, this time, of stated preferences.

For purposes of the reallocation exercise, we constructed several treatment sub-groups. The defining conditions were: length in residence (1 year, half-year, quarter-year) and budget scenario (budget increase, budget reduction, no change in budget).

For Group 1A we introduced two new items: we placed an increased emphasis on cataloguing and classification control and access systems by inferring an expansion in scope and flexibility as well as overall modernisation; Secondly, we inferred new, expanded and improved services by postulating the introduction of flexible access to company information. Of the two groups, 1A had the lesser experience of the library. We thought it applicable to force the respondents into shifts of emphasis by increasing/decreasing the budget scenario (+, −, = 10 per cent). Group 1B had a full-term experience of the library services. We tested this group by adding the new item of 'cataloguing & classification' only. In addition, we applied the 'Nationality' factor to see if differing measures of emphasis would be attributed.

In an overall summary of Group 1A, we notice minor amendments to existing budget-lines, but it is interesting to note that of the two major expanded services, company information is accorded much greater significance than cataloguing and classification control systems: a choice

TABLE 1. *Group 1A (students at quarter/mid-term) – budgetary reallocations shown in overall summary and by decreasing scenario.*

	Current	*Overall summary*	*Decreasing scenario (−10 per cent standardised to 100)*
BOOKS	36	36.275	36.59
PERIODICALS	45	43.239	44.59
SECONDARY SOURCES	8	8.375	7.627
CATALOGUING & CLASSIFICATION	3	1.014	1.426
COMPANY INFORMATION	3	5.272	6.188
MISCELLANEOUS & STATIONERY	3	2.662	2.069
SPECIAL COLLECTIONS	2	1.803	1.498
OTHER (Specify)		1.359	
TOTAL	100	99.999	99.98

for the information and material itself rather than system improvement. See Table 1.

Group 1A had been split into three, giving each sub-group a decreasing (−10 per cent), a static (100 per cent), and increasing (+10 per cent) budgetary scenario.

When forced to make adjustments because of a loss of 10 per cent spending power, the respondents are definitive in their trade-off: cut a little from each, but nevertheless, secure a major improvement in company information sources and resources. See Table 1.

Table 2 sees a continued maintenance of this trend for those respondents with a stable budget target, with shifts of emphasis due to variations in budget pressure.

It is clear that when the respondents are confronted with the two new propositions in question, in a financial situation of some pressure, then their priorities stipulate relatively clearly and consistently their preferences and course of action. Whilst minor adjustments are indicated for the continued collection of existent materials, it is interesting to see no major reallocation spelled out.

Group 1B has had full-term experience of the library. We wished them to make only one major decision, but we wished to analyse that decision according to the 'Nationality' hypothesis. Arguably, the more sophisticated and more practised of the users may require/deem necessary less extra investment than those less-skilled users. We wished to discern a measure of satisfaction or need for modernisation. For Group 1B, the budget was stable, i.e. fixed at 100. Table 3 shows overall summary figures when only one budget item is expanded or introduced. The statement to almost double resources for cataloguing and classification systems is clear.

Following this introduction, we decided to apply the 'Nationality' groupings as outlined in Paper 1[2], the table of which is here reproduced as Appendix 2. We wished to discover if 'Nationality' was a significant factor in the reallocation of financial resources.

Sub-group 'AA' bears out the main trend of the overall summary in Table 3 but with some interesting deviations from the norm and from the other national groupings below. Whilst there is a distinct interest in investing in cataloguing and classification systems, it is arguably a more moderate interest than for the other findings of Group 1B. In addition, Group 'AA' subtracts from 'Books' as well as other items to subsidise its investment – 'Books' being perhaps the more flexible of the major expense centres. Finally, it is the only group to increase resourcing of 'Secondary Sources' or access points to the literature.

Both the Nordic and Latin groups invest much more heavily in cataloguing and classification, but to finance their trade-off, they have selected the periodicals budget which is arguably the least flexible and most likely to suffer damage in the event of selected financial sacrifices. The Nordic group is most explicit in its rejection of financing 'Secondary Sources' and, like the Latin group wishes to strengthen the book collection. This is a trend which was already discernible in the first paper.

TABLE 2. *Group 1A – budgetary reallocations shown by static and increasing scenarios.*

	Current	*Static scenario*	*Increasing scenario (+10 per cent standardised to 100)*
BOOKS	36	35.244	36.486
PERIODICALS	45	43.689	43.365
SECONDARY SOURCES	8	7.717	9.336
CATALOGUING & CLASSIFICATION	3	1.636	0.632
COMPANY INFORMATION	3	7.626	5.211
MISCELLANEOUS & STATIONERY	3	2.18	3.074
SPECIAL COLLECTIONS	2	1.907	1.897
TOTAL	100	99.999	100

TABLE 3. *Group 1B (students after complete year of study) – budget reallocations.*

			By Nationality		
	Current	*Overall summary*	*AA*	*Nordic*	*Latin*
BOOKS	38	38.384	36.815	38.747	39.108
PERIODICALS	45	43.221	44.422	42.583	41.788
SECONDARY SOURCES	8	7.465	8.612	5.303	7.550
CATALOGUING & CLASSIFICATION	4	6.673	5.945	7.251	7.394
EXTERNALLY PURCHASED PHOTOCOPIES	2	1.826	1.618	2.722	1.912
SPECIAL COLLECTIONS	3	2.242	2.13	3.069	2.218
OTHER (Specify)		0.189	0.357	0.325	0.029
TOTAL	100	100	99.999	100	99.999

Emergent findings

(1) When two new factors are ear-marked for expansion/introduction, then it is the new service providing hitherto unheld information resources in an area in demand, which supersedes systems renewal. In fact cataloguing and classification systems are definitively penalised to pay for 'Company Information' – dominant over all other factors.

(2) In an otherwise stable, relatively unchanging library environment, when no other major alternative is proposed, then there is a distinct motivation to invest more heavily in cataloguing and classification systems.

(3) Varying the budget scenario interestingly provided different results, not particularly significant in their variation, but notable that in the decreasing scenario (Table 1) i.e. when financial pressure is at its highest, company information was allocated the most resources.

(4) Application of the 'Nationality' hypothesis also furnishes interesting findings: although trends in each individual group follow the overall trend, Group AA makes minor but important modifications which are not supported by either Nordic nor Latin.

Conclusions

The completion of the budget question constitutes the termination of phase 1 of the overall objectives.

(1) The survey itself proved both effective and productive as a method of communication and data collection.

(2) The system of analysis proved valid and flexible to handle wide-ranging summaries of data. The methodology also demonstrated that a satisfactory response rate can be engendered, in a closed environment, by suitable approach and return methods.

(3) Data collection has been concluded for qualitative and quantitative measures of perceptions of the service[3] and statements of preferred resource allocation.

(4) Useful management data for the library administration and policy-forming body has been provided for stages three and four of the survey.

(5) Indications and ratings reveal that certain sectors of the user-group evaluate in significantly different ways from each other. Whilst major trends are repeated across the board, certain variations within groups give rise to various implications for future services. Indicators are clear on need for systems renewal and new information services, but we have also gained a measure of their relative and interactive importance.

Whilst findings are valuable for future resource allocation, and policy formulation, we must now weigh these findings against those of another segment of users (Stage 2) in order to gain a more complete perspective.

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Appendix 1: excerpts from questionnaire.

SURVEY OF USERS OF INSEAD LIBRARY

INSEAD LIBRARY is concerned about maintaining library vitality in an age of increasing costs, and diversifying sources and media of information. It is important that INSEAD provides the library resources and services that are adequate to the needs of future participants. They can benefit from your experience by your contribution which can change and improve the library. To this end it will be beneficial to know where you find its strengths and weaknesses. Your taking a few minutes to complete this questionnaire will aid us in the effort to best serve your successors.

Please be as frank in your evaluations as possible. The questionnaire has been designed to allow ease of interpretation and response.

Please note at the end of the questionnaire we have provided a space for additional comments and criticisms which you may have about current library operations.

Thank you.

D. Gautschi
B. Norton

21. **Budget reallocation**

Described below is a broad outline for the reallocation of the library budget. We want you to perform your own reallocation of the library budget based upon your usage, needs and requirements of the library.

The library may be improved for your purposes if the budget were to be reallocated and expenditure focussed on new or different resources, or if simply more of the budget were concentrated on areas currently lacking for your needs.

In the first representation (A) below, current library budget allocation is indicated in terms of spending power – money actually spent on buying information materials.

In the second representation (B) new factors are introduced breaking down and indicating possible shifts of emphasis in the collection.

To reallocate more of the budget to materials which you think should receive more support, simply add to that allocation in subtracting from others.

GROUP 1A

Current

A		
	BOOKS	36
	PERIODICALS	45
	SECONDARY SOURCES	8
	CATALOGUING AND CLASSIFICATION	3
	COMPANY INFORMATION	3
	MISCELLANEOUS & STATIONERY	3
	SPECIAL COLLECTIONS	2
		100

Assume that the library budget is (i) decreasing −10 per cent = TOTAL 90 (ii) fixed = TOTAL 100 or (iii) increasing +10 per cent = TOTAL 110 (according to group).

In terms of where your priorities would lie – according to *your* needs – please reallocate your budget accordingly.

B *Current allocation*		*Your reallocation*
36	BOOKS	_____
45	PERIODICALS	_____
	– Selection of more titles (breadth)	_____
	– Newspapers on microfilm	_____
	– Length of periodical titles (depth)	_____
8	SECONDARY SOURCES	_____
	– Printed sources	_____
	– Online access to outside databases	_____
3	CATALOGUING AND CLASSIFICATION	_____
	– Develop online catalogue of library stock	_____
	– Access to stock by variety of approaches	_____
	– Facility to produce lists of stocks to take away	_____
3	COMPANY INFORMATION	_____
	– Selection of more company reports	_____
	– More directory-type holdings	_____
	– Speedier access to up-to-date information	_____
3	MISCELLANEOUS & STATIONERY	_____
2	SPECIAL COLLECTIONS	_____
	OTHER (specify): _____	

100	YOUR TOTAL	90	100	110

(See p. 380 for Group 1B)

Current		
A	BOOKS	38
	PERIODICALS	45
	SECONDARY SOURCES	8
	CATALOGUING AND CLASSIFICATION	4
	EXTERNALLY PURCHASED PHOTOCOPIES	2
	SPECIAL COLLECTIONS	3
		100

B *Current allocation*		*Your reallocation*
38	BOOKS	_____
45	PERIODICALS	_____
	– Selection of more titles (breadth)	_____
	– Newspapers on microfilm	_____
	– Length of periodical titles (depth)	_____
8	SECONDARY SOURCES	_____
	– Printed sources	_____
	– Online access to outside databases	_____
4	CATALOGUING AND CLASSIFICATION	_____
	– Terminal access to computer-based catalogue	_____
	– Computing – printer facility to produce required lists	_____
2	EXTERNALLY PURCHASED PHOTOCOPIES	_____
3	SPECIAL COLLECTIONS	_____
	OTHER (specify): _____	
100	TOTAL	TOTAL 100

APPENDIX 2. *Nationalities by groups.*

Anglo-American 'AA'	*German-Scandinavian 'Nordic'*	*French-Latin 'Latin'*
Canada	Germany*	France*
USA*	Denmark*	Belgium*
UK*	Finland	Spain
Israel	Norway	Italy*
S. Africa	Holland*	Portugal*
India	Sweden	Austria
Hong Kong		Greece
Australia		Switzerland
New Zealand		

* = Dominant nationalities.

(Some 15 other countries were also represented – too diverse and small a group, 6 per cent only of total sample and overall user-population).

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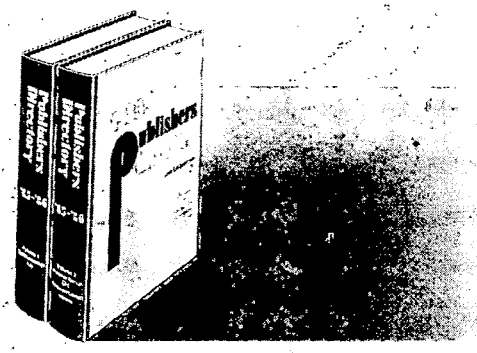


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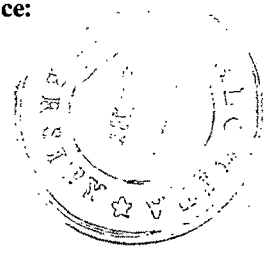
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China, the inscrutable phoenix: libraries from pre-Ming to post-Mao

Tony Evans
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Paper presented as the Aslib 18th Annual Lecture, Aslib, London, 4 June 1985.

Historical overview

It is said that one of the first recorded libraries of any magnitude was that of the Imperial Chou dynasty at Luoyang in the modern province of Henan in the 7th century BC, although the existence of libraries in China can be traced back to the Shang Dynasty about 500 years earlier. There is indeed said to be some positive evidence of documentation activities also going on in the 12th Century BC, since there are records of seismic activity dating from that time. Some three hundred years after this 'first' library, however, the infamous act of 'Burning the Books' took place. This was carried out on the orders of Shih Huang Ti – the self-styled 'First Emperor' of the Ch'in Dynasty as a result of a petition from his First Minister to eradicate all earlier teachings. Not only did they condemn those who did not hand over their books, to forced labour on the Great Wall for four years, but also buried alive several hundred scholars who were suspected of knowing the books so thoroughly that they could reiterate their contents from memory. This act of 'Burning the Books' repeated itself of course during the Cultural Revolution as to a certain extent did a 20th century, although not necessarily much more humane, process of burying alive take place. The emperor was said, however, to have preserved copies in the Imperial Library, and especially those dealing with divination, pharmacy, medicine, agriculture and arboriculture. He also might, to perhaps stretch a point a little, have been said to have been involved in the documentation world, since he was apparently responsible for a wide range of standardisation including the track gauge of chariots – possibly to help him get the dimensions of the Great Wall right (from some parts of the Great Wall I saw however, a mountain goat would have problems let alone a horse and chariot).

Thus imperial and private libraries came – and undoubtedly went – over a period of some 3,000 years with many examples particularly in the last few hundred years of very high level professional activity including the development of a Chinese classification scheme known as the Si Bu

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Fa (The Four Division Classification Scheme) and various massive encyclopaedias and bibliographies – the largest known as the *Si Ku Quan Shu,* apparently being 36,304 volumes. These libraries, particularly those of the last 700 years, became however the basis for the founding of the Capital or Metropolitan Library of Peking in 1909, the same year as the introduction of the first public library legislation. This library was to become the National Library of Beijing in 1928 although copyright deposit was initiated several years earlier in 1916. As yet they have not, I believe, signed the International Copyright Convention – I understand however that the Publishers Association is working on them. There do not appear to be any readily-available figures as to the size of the National Library when its doors were formally opened to the public in 1912, although many of the earlier imperial and private libraries were said to have approached 100,000 volumes. By 1949 however it was said to have around 1,400,000 volumes and by the 1980s over eleven million books, periodical issues and other items.

A completely new building in another part of Beijing of some 1½ million square feet is nearing completion. 1949 was and indeed is of course a very auspicious date in Chinese history being the year of the foundation of the People's Republic of China. Prior to that however, the effect of the Kuomintang regime, the Sino-Japanese war and subsequently the civil war had a disastrous effect on libraries of all types. Professor Huang Zhongzong, now the Head of the Department of Library Science at Wuhan University recorded that: 'Although there were 5196 libraries of all types in 1936, there were only 391 in 1949' (this of course, for a population of hundreds of millions).

Indeed there is an established dictum in most libraries that books published before 1949 are still kept quite separate although the point of this is now being questioned. Earlier this year however, when we were helping to plan the new library at Beijing Agricultural University, the holdings for pre-1949 material were quoted quite separately, and we were told that this was the only material that *had to be* in closed stack not necessarily because it was valuable – although this was often the case – but because of the date – 1949. The growth during the next sixteen or so years was however considerable, particularly as a result of several national library conferences although from 1958 with what has been referred to as 'a shift to the left' (which we might more consider to be 'a shift to the far left' I imagine) things began to change.

The 'Great Leap Forward', as it was called from 1958, which became the prelude to the Cultural Revolution, lent its own apparently unrelated problems. Impossibly high economic targets were set which resulted unfortunately in highly inflated figures and unrealistic claims. Thinking only of increasing readers and circulation figures many other areas such as cataloguing, collection development and maintenance were sadly neglected. This unreliability of statistics still appears to be a problem today at least as far as we found on several library visits. It wasn't helped of course by the use of a Chinese unit of 10,000 sometimes (as in India)

which frequently confused interpreters, the considerable duplication of copies in university libraries for undergraduate use and last but not least a tendency – sometimes but not always and rarely identifiable—of counting each periodical issue as a separate item.

I was fascinated on my visit in February 1985, when I was on my way to the Institute of Scientific and Technical Information in Beijing to give a lecture. I had been met by a young Chinese librarian, who in excellent English told me that she remembered one of my lectures in 1982 (the Chinese are good at flattery!) and specifically my answer to a question about 'how many books I had in my library'. I had given my usual reply that I was not particularly interested in how many we had but much more in how many were used. Perhaps of course I hadn't said anything else of any value, but if I'd helped to readjust the balance of useless statistics and nothing else then something had perhaps been achieved.

In tracing the historical aspects we now come to the Great Proletarian Cultural Revolution which lasted from 1966 to 1976. A very great deal has been written about this of course and I will not attempt to repeat any of it here. Suffice it to say that intellectuals in general suffered a very great deal and we heard many stories of hardship and loss of unique private collections. Even those libraries that did not suffer direct losses – and there were relatively few – stood still from most points of view, not least of which was the result of fear in being seen to be engaged in any so called intellectual activity. This aspect was very practically illustrated by a member of staff when we visited Fudan University in Shanghai, he said, 'there is still a lot of effort going into establishing that the stock and the catalogue match up'.

It was unquestionably however, as I mentioned earlier, a second major 'Burning of the Books' which will leave its mark for some time to come although without doubt the phoenix is clearly rising again.

The growth over the last nine years has been phenomenal as indeed it has in many areas of Chinese activity. I commented earlier about the reliability of statistics but you do see such statements as: 'By 1981, there were 1,731 public libraries above county level with a staff of 19,641' and, '212 university libraries with 3,568 staff and 37.28 million volumes'. I find it impossible even to think in such large figures let alone rationalise them.

Co-ordination of activities for each type of library does take place with for example the Beijing National Library dealing with public libraries, the Academy of Sciences with science libraries and the Ministry of Education for university libraries. There has also been, since 1979 considerable activity in the area of standardisation as the result of the formation of the National Documentation Standardisation Technical Committee of China – the equivalent of the Documentation Standards Committee (DOS) of the British Standards Institution. They have produced work on for example cataloguing, classification, thesauri, tape formats for information exchange – and one which I couldn't quite work out – 'sex codes for people'.

General aspects

I should like now to jump from the historical overview to a look at some of the grass roots aspects and problems of libraries and in particular university libraries – followed by a rather more extended look at the Institute for Scientific and Technical Information of China (otherwise known as ISTIC) which I have been able to visit several times. The nearest comparison which I can make I think is that it is a combination of Aslib and the Science Reference Library, and functions in a very similar manner to other national information or documentation centres in science and technology overseas. I have had the opportunity of visiting some eight university libraries in all, some obviously in much more depth than others. Nankai University in Tianjing, East China Normal University (ECNU) and Fudan University in Shanghai, Wuhan University and Huazhong University of Science and Technology in Wuhan, and in Beijing, Beijing Agricultural University, Tsing Hua University and Peking University itself.

In addition to these I did visit the National Library on each occasion I was there and also on one occasion the Shanghai Municipal Library. This was indeed well worth a visit if not for the very high level of activity, the very good collection of trade literature and possibly the 'longest' catalogue in the world, then at the very least for the fact that it is housed in what was the British Jockey Club with the original wrought iron railings on the stairs still there depicting a horse's head and the English rose. This very high level of consumer activity was in fact a feature of every library I visited – at the Municipal library in Shanghai they were only allowed tickets for a limited period and then had to relinquish them for reissue to another mass of readers.

To return then to the university libraries – they were all, with the possible exception of Tsing-Hua and Huazhong very traditional in outlook, that is to say comparable with the UK situation several decades ago, particularly in the overall closed-access approach and almost complete lack of reader services as we know them today. There is I feel however a major fundamental reason for this in addition to what I've termed 'traditional outlook' and that is the result of the privations and problems of earlier years. So much time and energy has gone quite rightly into Rebuilding (with very much a capital R) that it has not left a great deal for different approaches. In the last couple of years however there have been positive signs of redressing the balance. In a paper at the IFLA (International Federation of Library Associations) conference in Munich in 1983 by Hu Yaohui, of the Library Administration Bureau in the Ministry of Culture, entitled 'China's four modernisations and library service' he said, 'with a view to raising the utilisation ratio of library collections, more effective measures should be taken to emphasise the introduction, publicity and recommendation of library resources'[1]. Similarly Peng Guiyan, Librarian of the Chinese Academy of Sciences, in a paper on readers' services in his library talked about 're-organising the collection of reference books and literature retrieving tools'. He

included such phrases as 'help readers in retrospective reading and current information' and 'helping the readers search for what they need in a wider horizon'[2].

In a similar way large undergraduate reading rooms and separate faculty reading rooms for reference books, periodicals and foreign language material for example, were the norm rather than the exception.

It was however only appreciated towards the end of the overall visit that much of this also seemingly outmoded approach was due in no small measure to the basic educational system.

For example, the starting age at university is normally about seventeen and sometimes as early as fifteen or sixteen with most, if not all, of the early undergraduate teaching through lectures and recommended texts. Certainly an improvement on the learning by rote approach of the Middle East for example, but nevertheless more comparable to our pre-university years up to A level. Not only did this therefore affect the closed-access/reading room approach but also the library stock situation where 30–50 duplicates of basic reading texts were often purchased. Thus the material used by staff and postgraduate was essentially quite different and could therefore with equanimity be kept quite separately. Foreign language material was for example, used relatively exclusively by faculty and advanced postgraduate students, particularly by the former for 'bringing themselves up to date'. It was stated at Wuhan for example, that teaching staff expected to spend quite a lot of time doing this (they normally only lectured for some six hours per week).

Opening hours were a variable feast although in total probably nearer 60 rather than 80 hours a week as we sometimes find in UK universities. The variation certainly occurred at lunch time when libraries were frequently completely closed for two hours – we found indeed at one university that we just couldn't get in at all – the librarian was not allowed a key – janitors reigned supreme! There was however a very recent comment by Luo[3] who said, 'Opening hours for information documentation centres and university libraries may be longer depending on the users real needs and if possible, board and accommodation should be provided for those who cannot get home on the day of the visit'. Some other specific aspects were as follows:

Library stock

Total stock varied from just under 1 million volumes at Huazhong to 3½ million at Peking University. Of these there were the order of 60–70 per cent Chinese books, 20–30 per cent foreign books and 8–10 per cent periodicals. I have already commented however on the unreliability of statistics and particularly, with respect, Chinese ones.

Library budgets

There was a suggestion that a normal level of expenditure might be expected to be of the order of five per cent of the total university budget

(excluding salaries). This figure like other monetary figures is however effectively impossible to compare with the UK situation due to currency conversion and a quite different economic structure. Nevertheless a simple calculation of expenditure (in sterling at say three yuan to the pound) suggests an average figure of the order of £34 per student which is about forty per cent of the UK figure. This represents budgets of some 5–700,000 yuan per annum.

Foreign material will of course be comparable in cost at the going exchange rate but Chinese books very, very much less. They generally felt they could purchase all the Chinese material they required but that purchase of foreign material was not only restricted because of the high cost but because of the general problems of foreign exchange.

Acquisitions

As already stated these consisted predominently of multiple copies of Chinese textbooks with total rates quoted from 30,000–120,000 volumes per annum. Of these between twelve and twenty-four per cent only represented different titles of which over half were often foreign publications.

Foreign books and periodicals have to be obtained through a recognised import/export agency such as the China National Publications Import and Export Corporation and the China Book Import Centre. Whereas a few years ago there appeared to be very few bodies of this type there has been considerable expansion and the system seems to me to be getting rather more complicated than less. Valiant efforts by both the Publishers Association and the Book Promotions Department of the British Council are beginning to bear fruit and the latter have recently expended quite a large sum in not only sending a member of their staff out there but also supplying a considerable number of copies of *British books in print* and the *British national bibliography*. There have also of course been many visits made by library suppliers.

These import/export agencies in Beijing also send out annotated lists to universities of items available from foreign publishers in differing forms and which are often partially at least paste-up jobs from publishers' catalogues.

These lists did not appear to be complete by any means and how they are derived is not clear. They do however provide quite a good guide for selection purposes. It was interesting to note that there were two research students working in this field in the Department of Library Science at ECNU, Shanghai; one analysing the acquisition of foreign books in Shanghai and the other looking at the functioning of these agencies. There seemed to be delays not only in the initial processing of requests but also in the agencies sending them on once they had received them. One example was seen of a total period of two years from initiation of the order to final receipt.

Selection of material was a joint consideration by faculty and library staff with the latter having the final say (UK universities please note!). There was however a further example of an aid to selection that was seen in Wuhan and that was their 'Centre of foreign teaching materials'. This was possibly the most up-to-date collection of foreign literature that we saw and was provided for viewing by teachers from the three major provinces adjacent to Wuhan. There are nine similar centres throughout China and they are financed quite separately by central government.

Their collections were on the whole very good although reference material often tended to be rather out of date. Current periodical issues were being received within only a few months of publication and one got the feeling that they did not tend to 'go astray' as they are wont to do in many developing countries.

Technical processing and automation

Technical processing is all carried out by very traditional methods and sad to say with many of the clerical aspects being undertaken by professional staff. It must be accepted of course that this is often necessary because of language abilities which in itself is often the cause of a very slow processing rate (a cataloguing figure of twelve books a day was quoted, for example). The Peking classification is used which is comparable with our usual Western classifications such as Library of Congress or Dewey, except, perhaps inevitably, rather different developments in philosophy, politics and other social sciences. Catalogues were of a traditional pattern although the subject approach often left more than a little to be desired. It was particularly interesting to note that although as stated earlier, the closed-access principal was the norm, the stacks were often in general if not specific classified order. There were usually very considerable backlogs indeed awaiting cataloguing.

Automation is of course an area in which they are particularly interested but unfortunately, as has been found elsewhere, thought to be the answer to all their problems. This was perhaps best illustrated by a question asked in Shanghai which was: 'How can automation help us in classification?' There is clearly a considerable amount of discussion going on and the occasional sight of some experimentation although theory still has very much the upper hand. Cataloguing is almost inevitably their main area of discussion due to their dominant interest in collection building, whereas online retrieval rarely got a mention, although I will consider that in a little more detail when looking at ISTIC later.

The only two live situations I saw were at Tsing-Hua University and the National Library. At Tsing-Hua there was an experimental online catalogue which although slow and very restrictive (it needed exact identification of authors initials for example) it was working. The National Library is also experimenting very successfully with MARC

tapes – one of the staff having spent a lengthy period at the Library of Congress in Washington.

The microcomputer is clearly beginning to have an impact generally although I didn't actually see any in a library environment. I've noticed in the trade press recently that one UK company has negotiated a quarter of a million pound contract and another American company has gone into a 'joint-venture' for the production of a Chinese version of their personal computer. There is of course also a lot of work going on in dealing with the problems of Chinese characters and there are regular reports of considerable developments in this area. China is certainly a land of contrasts – in the *China Daily,* 6 February 1985, there is an article entitled: 'Ancient abacus works in new computer age', which starts: 'At least 40 million people in China depend on the abacus in their daily jobs . . .'

There is clearly a need here for some very practical advice not only on what it might be possible to achieve in the long run but what is feasible in the short term, in order that they might have 'hands-on' experience rather than the mass of inevitable theory and impracticalities that usually abound in such situations.

Reader services

As already indicated these are almost non-existent apart from the normal book circulation procedures which are seemingly relatively heavy due to the closed-access situation. Few statistics were available although figures of 520,000 per annum were quoted for Wuhan and 800,000 for Peking.

There were no signs anywhere of what we would think of as an enquiry desk, nor indeed any mention of interlibrary loans, although the latter do clearly exist even though in very limited numbers as indicated from the 'British Library' visit in 1980. What is perhaps even more indicative of the very limited activity in reader services was that we did not meet any members of staff, apart from at Huazhong, who were engaged in such reader services activities, nor indeed was there any mention of them in the syllabuses of the various Library Schools.

Huazhong University of Science and Technology was however quite different not only in its much more purposeful approach to the Library in general, but also that it had an Information Section which although not directly part of the Library, worked very closely with it. It was administratively under the Division of Scientific and Technical Research of the University and had a staff of twelve, most of whom had been faculty members in various departments. Thus once again we saw this unfortunate dichotomy so reminiscent of many other countries (including the UK) that not only was it not readily acceptable that 'the Library' could have an information function but that a separate unit had been established with staff having no formal training in information science. In Wuhan however, there was mention of an information

retrieval group within the Library although I couldn't positively track it down.

Staffing

The overall staff levels did seem in general to be adequate although there appeared to be one point of confusion when we were discussing this area and that was in the use of the term 'professional staff'. This was often used essentially to mean 'non-manual' and thus include all staff directly engaged in library activities from graduates majoring in library science to library assistants direct from 'high school'.

The average total number of staff however in the university libraries was about 100 apart from Peking which was about twice that. Of these some 30 – 40 per cent were graduates although as few as three of these in Huazhong and six in Nankai for example, were graduates in library science. Wuhan was the exception to this where 21 of the 42 graduates majored in library science.

The more senior staff members frequently had other departmental subject responsibilities the most quoted discipline being history. This particularly applied to the 'chief librarian' situation where he or she was normally a full professor in another department and the library was effectively administered by the deputy librarian. The reason for this appeared to be that the universities would only accept somebody in the post of university librarian if he or she was completely academically equivalent to a full professor. There were seemingly no full-time professional librarians who met this criteria.

Professional education

The overall teaching programme tends to be very theoretical and perhaps unnecessarily extended at times. This is perhaps best exemplified by the teaching of cataloguing (*not* including classification) which takes a total of 120 hours of which 90 are on the theoretical aspects. Even in this area the lack of practical experience and the availability of material was a distinct drawback. This was illustrated to me by discussions with one of the postgraduate students who was planning his dissertation around certain aspects of the *British national bibliography* and the Library of Congress Catalogue but did not actually expect to be able to see and handle them. However the overall output from Library Schools is now very considerable indeed. Their courses in the areas of information science are similarly considerably longer than any in the UK and once again essentially theoretical in approach and requiring students to have, for example, a very firm grounding in many areas of higher mathematics. There were few signs of any real practical 'hands-on' experience of any type, and indeed the computer was not in fact functioning at all in the Wuhan Library School when I did eventually get the opportunity to see it.

I was however very impressed by the activities being carried out by the various Library Work Committees which we heard about both in Shanghai and Wuhan, the former predominantly perhaps because our host was the Chairman of the University Sectional Committee. They are concerned with the rationalisation and in some cases standardisation, of sometimes even the most basic of library operations such as opening hours and loan procedures. Unfortunately their efforts are once again being concentrated on such areas as acquisitions and cataloguing with reference and enquiry work being very low on the priority list. There was mention however of them looking at the problems of open stacks and making more of the collections generally available.

Institute of Scientific and Technical Information

The Institute of Scientific and Technical Information of China is, as I have said, the national information centre in science and technology although I more than just suspect that there is a certain degree of rivalry between it and the Library of the Academy of Sciences who in effect originally founded it. The history of it dates back to 1956 and the government's 'great call to march on science'. One of the important programmes listed was the establishment of an organisation to carry out scientific and technical information activities. Towards the end of that year the Chinese Academy of Science formally founded the Institute of Scientific Information (Chinese version!). In 1958 it was expanded and strengthened and changed its name to the Institute of Scientific and Technical Information of China (ISTIC), and in 1960 became directly responsible to the State Scientific and Technological Commission. It is thus responsible for the co-ordination of all information work in China – both collection and dissemination particularly in the natural sciences (pure and applied), and economics and management etc. It does not however include for example agriculture and medicine in its remit which are the responsibility of separate institutions. To give an idea of the extent of their activities and indeed their variety I think it possibly best, to quote directly from their own literature. Its principal tasks are said to be to:

1. Collect, selectively, scientific and technical information material at home and abroad in conformity with the needs of national economy in science and technology. The collections are to include research reports, conference proceedings, periodicals, patent literature, standard materials, product catalogues and samples, abstracts and indexes, translations and audiovisual materials etc.
2. Process the materials acquired and report them to users, as well as to produce information publications with emphasis on reporting the major achievements and development trends in the field of science technology at home and abroad.

3. Offer referral, translation and retrieval services as well as open-shelf and closed-shelf services and reprographic services of its collections.
4. Conduct information analysis and research with the aim of supporting policy-making in science and technology and problem solving, which are interdisciplinary and widely concerned in China's national construction.
5. Collect plans and findings of major research projects throughout the country and undertake exchange of achievements.
6. Carry out theoretical and applied research on information science and methodology as well as to develop modern information technology.
7. Organise the compilation of information text books and vocational training materials and the education and training of professional scientific and technical information workers.
8. Co-ordinate and provide guidance at national level for the work and activities of various scientific and technical institutions under the leadership of either the ministries of the central government or the local government.
9. Develop international exchange and co-operation in the field of scientific and technical information.

An all-embracing set of objectives if ever I saw one – it is indeed a massive organisation with a staff somewhat in excess of 1,200! – of which it is said that 370 are professors, researchers, associate researchers, engineers and librarians (note the librarians are the bottom of the heap again). Even the Chongqing branch some 1,000 miles away to the southwest has a staff of over 500. Their collections are immense and in terms of more recent material would I think match that of the Science Reference Library – their coverage of research report literature, patents, standards and trade catalogues for example is excellent. The pity of it all however is that only a few miles down the road is the Beijing National Library and the overlap is unfortunately very considerable indeed – this is of course very similar to the situation in many countries particularly the developing ones where foreign exchange problems are paramount – on the other hand there is the need to take full advantage of any government's willingness to support specifically scientific and technical developments and their associated features.

In any case, as one Chinese author, Lin Zixin put it: 'According to Chinese tradition, library work and information work are not quite the same. (Where have I heard that before!). Each has its own emphasis in the scope of collection, the mode of service and the aspect of function'[4].

Their work on various aspects on automation is considerable with an obvious emphasis on Chinese character processing but also in thesaurus construction and the development of information retrieval techniques.

As the same author referred to previously said, 'the policy of "walking on two legs" should be implemented, that is the introduction of foreign databases and the setting up of the Chinese document retrieval system should go side by side with stress put on the latter'.

There is indeed a grandiose scheme for a national network of online bibliographic and information retrieval which is however very much hampered by their overall internal telecommunications system, which they accept is creaking at the joints and plans are positively in hand to remedy the situation. Trying to explain the need for 'clean' lines at a university I was in during February 1985 was an uphill task. ISTIC is certainly active internationally and is the focal point for the UNESCO General Information Programme and for FID (Fédération Internationale de Documentation) and indeed hosted the Documentation Standards Committee meeting of ISO (International Standards Organisation) in Nanking in 1981 (this was in fact my first visit to China). As I have intimated, a very active institution indeed, typical of national documentation centres in other developing countries but which unfortunately also has some comparable negative aspects in that it seems to want to 'do its own thing'. This was illustrated by their education and training programme of their own staff in such areas as information processing, computer application etc., which is entirely in-service. They do have a very limited programme of short courses for outside people but did say that there were other information centres of various levels in many of the ministries each of whom take care of training their own staff. This could seem to be an area where rationalisation under the auspices of ISTIC, at least in Beijing, would be of particular value. This situation is however symptomatic of what seemed to me to be one of the aspects of Chinese management and administration – a complete acceptance of communicating vertically but a frequent unwillingness or at least resistance to communicating horizontally. This was illustrated when I was at Beijing Agricultural University talking about online retrieval services and possible links between the Ministries of Higher Education and of Agriculture and between the University and the Academy of Agricultural Sciences Research Institute – little positive information was forthcoming. Their most recent project is the initiation of a Masters degree in Information Science in September 1985, fortunately with advice from Professor Saunders and other UK experts. It is however fraught with the almost inevitable problems of trying to run a course at that level in a basically non-academic environment. For anybody who is interested one of the most comprehensive 'external' reports produced on ISTIC was as a result of a UNESCO visit by Michael Brawne and Stephan Schwarz of Sweden in 1980[5].

Library buildings

To finish then, let us look very briefly at the library or information centre building situation and future programme especially since the

principal reason for my visit in February 1985 was to advise on the planning of the new library at Beijing Agricultural University.

An excellent paper was given at the IFLA conference in 1982 in Montreal by the Deputy Director of Tsing-Hua University in Beijing[6]. It covered so much 'forward-looking' thinking in terms of flexibility, open versus closed access, computer-based systems and last but not least the need for complete co-operation between the librarian and the architect.

Alas however any plans we saw including even those for ISTIC, the Agricultural Research Institute and the new National Library were very traditional indeed with massive reading rooms and predominently closed access amongst other things.

In Beijing Agricultural University we (that is to say Harry Faulkner-Brown and I) had the task of formulating an architect's brief for their proposed new building in a period of somewhat less than three weeks. Fortunately several members of the University and of Beijing Architectural Design Institute had visited the UK some months previously so we had a very high degree of rapport with them. We ultimately had no problem in arguing open versus closed access with them after they had seen some UK libraries (almost the opposite) but had much more of a problem trying to convince them about readers having access to a wide range of professional senior staff.

Conclusion

There is no doubt at all that the great traditions of Chinese librarianship, which were founded many centuries ago and have gone through a very dark age, are now emerging once again to find their rightful place both nationally and internationally. The profession is more eager to learn than perhaps in any other country I have visited, as illustrated by the quantity and depth of questioning that took place, particularly in Wuhan once I had established myself there. This is a point which has been raised many times before but is possibly even more relevant in a country such as China. This need to acquire a rapport with them and in particular to understand their professional and philosophical outlook in order to make positive progress is vital and can only really be achieved by a series of visits, and I say this unashamedly – *by the same people.* The exponential effect of future visits should be high especially if all the experience gained by visitors of whatever specialisation within the library/information/publishing/bookselling fields could be consolidated.

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The costs of a multi-site library service: a study of Brighton Polytechnic

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The research on which this article is based was originally carried out as part of a project for the Diploma in Management Studies at Brighton Polytechnic.

Polytechnic libraries are increasingly finding the need to justify their costs, but although many are multi-site, differences between them have hampered attempts to apply standards. This article gives the results of a study carried out at Brighton Polytechnic to identify the proportion of staffing and materials costs which could be attributed to the fact that it operated nine separate libraries rather than one central facility.

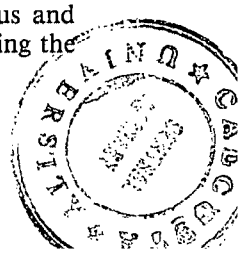
In analysing costs and benefits, some advantages emerge for the multi-site library. Financial costs are generally cited as a major disadvantage, but polytechnic library statistics show no correlation between funding and number of sites.

The study at Brighton calculated the effect of the multi-site situation on staff numbers and gradings. It found that this accounted for 36 per cent of the salaries bill. A survey of book and journal provision showed that 14 per cent of the materials budget was being spent on duplicating material across sites.

Overall 28 per cent of the library budget at Brighton could be attributed to the multi-site factor. The effects on capital equipment and space utilisation are also noted. At the same time, it is recognised that costs cannot be considered in isolation from services and that many other factors affect the level of funding in the multi-site library.

When the polytechnics came into existence in the 1970s, it was acceptable to regard 'multi-sititis' as a temporary complaint from which libraries would eventually be cured by ambitious new building programmes or at least relieved by continuing injections of generous capital and revenue funds. In the past few years, there has increasingly been a need to justify costs within a more adverse economic climate, and to accept that in future libraries will be expected to continue to develop services with far more limited resources. As a result, most polytechnic libraries have been actively engaged in closing or merging their smaller more uneconomic sites. Few, however, have attained single or even dual-site status and most continue to operate with a number of different sites reflecting the geographical spread of the institutions in which they operate.

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Ashworth, writing on multi-site libraries in 1976[1], looked forward to a more scientific study of their financial costs. Such a study has never been undertaken, perhaps because of the low priority attached to this aspect during the growth period, but also because of the many differences between polytechnic libraries which hamper any attempts to apply standards. More recently, McLean has considered the management of the multi-site library in the context of declining funds and advances in technology and has again drawn attention to the lack of consensus on costs in relation to services[2].

This article considers some of the general costs and benefits of the multi-site library and examines in detail the financial implications of one such service. It is based on research carried out at Brighton Polytechnic to identify the additional costs incurred by the multi-site factor. For comparative purposes, use is made of the 1982–83 statistics produced by the Council of Polytechnic Librarians (COPOL).

Costs and benefits

In looking at the multi-site library, a balance has to be drawn between the costs and benefits involved. On the one hand, the large central library can provide a comprehensive stock and wide range of services, but may be at some distance from the teaching area and because of its size rather impersonal in atmosphere; on the other, the smaller site library caters more specifically for course needs, gives a more friendly, personal service and is closer to teaching departments, but may be more limited in the stock and services it can offer.

Oldman's research has indicated that students' expectations of libraries rise as standards of provision increase and that they learn to adapt to whatever level of service is provided[3]. This suggests that the user will tend to prefer the type of library he or she knows best. There do appear, however, to be some advantages for the multi-site library, provided it is funded well enough to maintain a degree of self-sufficiency and provide an acceptable level of service.

The prime benefit of the multi-site library is its accessibility, whereas most single-site libraries involve some element of travel. In the case of very small libraries, this advantage needs to be weighed carefully against economic considerations. Many polytechnics have closed their smaller sites, and those that remain open must now be vulnerable to threats of closure or reduction in services. McLean has suggested that a minimum of four to five staff is needed to maintain a basic level of service[4]. Where the library has less staff than this, generally a lower grade of professional service will be provided over shorter opening hours with less variety of stock and facilities. In this case, pressure will be put on staff at the busier site libraries in order to maintain basic provision at the small units.

It could be argued that the medium-sized library in fact exhibits most clearly the benefits of the multi-site situation from both the library staff

and user's point of view, in that it avoids the problems of the more bureaucratic and impersonal form of organisation, which characterises the larger unit yet is of sufficient size to provide a full range of services to its users.

The major disadvantage of this type of library is generally assumed to be the additional costs incurred in comparison to the central facility. Yet a study of COPOL (Council of Polytechnic Librarians) statistics produces no clear pattern which distinguishes this group of libraries or relates their costs to the multi-site factor. In studying costs at Brighton Polytechnic, therefore, it was necessary to look mainly at internal evidence in order to ascertain the proportion of library spending which could be attributed to the fact that it operated a number of libraries rather than one central service.

The library service at Brighton Polytechnic

Brighton Polytechnic's libraries form part of the integrated approach to library, media, reprographics and educational development services adopted by the Department of Learning Resources. This means that library staff generally have a wider role than their counterparts in more conventional library organisations. Of 114 staff, 80 are employed in library services, either at one of the four sites or the two central sections, Library Technical Services and Library Media Services.

Unlike some other polytechnics which operate one large central library and several small annexes, Brighton is truly multi-site in that none of its libraries provides a central focus. They vary in size according to student population served, the largest serving 2,500 FTE (full time equivalent) students and the smallest 600. Each of its four sites has a major library providing a full range of services. The three sites in Brighton itself (Moulsecoomb, Falmer and Grand Parade) are about three miles apart, while the fourth is twenty-five miles away at Eastbourne. Attached to each site library is an annexe serving one or two departments located away from the main buildings. These have shorter opening hours and generally more restricted services. With four main sites, four annexes and a ninth library run jointly with the Area Health Authority, Brighton currently has more staffed service points than any other polytechnic.

A development plan begun in 1975 committed the local authority (East Sussex County Council) to provide funds for additional staff and materials to bring about a substantial improvement in the standard of service. In common with other polytechnics, however, it has suffered financial cutbacks in recent years resulting in the loss of several posts from its establishment and a reduction in the general level of funding. Although it still appears to be generously staffed and funded in comparison to many other polytechnics, it has now become necessary to scrutinise far more closely expenditure on staffing, materials and equipment. This study was undertaken as part of a continuing

monitoring process, in an attempt to relate the costs of these items to the multi-site factor.

Staff numbers

Staffing is the most significant item to consider in any financial study, because the salaries bill at Brighton as elsewhere now accounts for over 50 per cent of total costs. Though it may appear self-evident that the library service with several sites has a greater need for staff, the COPOL statistics do not show any correlation between number of sites and salary costs or ratio of library staff to students. Some single or dual-site libraries operate as might be expected at ratios as high as 1:140, but others are only in the region of 1:80. Conversely, some multi-site libraries with six or more sites have ratios under 90, but others are above the mean for all polytechnics of 1:110.

While these differences raise many questions about the relationship between statistics and standards of service, it is clear that number of sites alone is not a significant factor in determining staffing needs. In the absence of an agreed formula similar to the staff-student ratios now being applied to teaching departments, polytechnic librarians have had to establish their own particular staffing norms. A NATFHE (National Association of Teachers in Further and Higher Education) College Libraries policy statement in 1982 recommended a ratio of 1:80 for single-site libraries with an unspecified addition for extra sites[5]. This is generally regarded as an impossible ideal by polytechnic librarians and many would regard 1:100 as a more attainable target[6].

It was not therefore feasible to consider the staffing ratio at Brighton in relation to other polytechnics on the basis of the multi-site factor alone. Instead, it was necessary to look at the staffing ratios within the various site libraries themselves and draw from these a picture of the effect of library size on staffing requirements. The largest site with 2,500 FTE students operated at a staffing ratio of 1:128 while the smallest with 600 was at 1:60. It was reasonable to assume that a single central library providing the same level of service would work to the higher of these two ratios. On this basis, a central library serving Brighton's total student population of 5,400 would need a staff of 42. At present, out of a library staff of 80, 63 are employed in the site and annexe libraries. The remaining 17 are in central services outside the site structure; these include the Head of Learning Resources and those in Library Technical Services and Library Media Services. It was assumed that these two functional divisions would remain to provide cataloguing and media support to the central library, but that the numbers employed in each of them would be reduced in proportion, bringing the total central staff down from 17 to 13. The total staffing establishment would therefore stand at 55 rather than 80 and the staff-student ratio at 1:98 instead of 1:67. This was very close to the target of 1:100 informally adopted by

other polytechnic librarians. The multi-site factor therefore accounted for 25 of the 80 library posts. Taking an average salary across the library service, this represented 32 per cent of the total salaries bill.

Staffing structure and gradings

A study of COPOL statistics and polytechnic library organisation charts shows as much variation in salary gradings and structure as in staffing numbers[7]. Basically, however, most multi-site librarians conform to Brighton's pattern with a broad middle-management band of site librarians (Site Resources Officers) responsible directly to the Head of Learning Resources and themselves responsible for the group of subject librarians (Course Resources Officers) and library assistants working on the site. Site thus forms the primary division in the multi-site library, with Technical Services almost invariably a central function responsible for ordering, cataloguing and often also classifying library materials. At Brighton, there is also a central section which co-ordinates the acquisition of media for the site libraries. By contrast, the single or dual-site library has its main division by subject librarian and a variety of functional groupings.

In looking at the way in which library organisation is affected by the multi-site factor, it is relatively easy to identify areas of non-professional work which are now duplicated across sites and create the need for extra staff in this type of library. A COPOL survey in 1981 calculated the sum of weekly term-time opening at each polytechnic library. Whereas a single-site library had total opening hours of 75.5 per week, Brighton's hours with eight libraries at that time totalled 441.5. Compared to the single-site library, therefore, a high proportion of the work of non-professional staff must be taken up with routine counter duties. In addition, the rota systems necessary to maintain these long opening hours over a number of service points mean that a certain number of staff will always be absent during peak day-time periods.

As to professional staff, the roles of site and subject librarian, separated in the multi-site library, would be combined in the single-site and an alternative management structure adopted. The subject librarian's main responsibility is to provide support to a particular group of courses whether the library is single or multi-site, although it is recognised that professional staff in the smaller site library will spend a higher proportion of their time on enquiry desk duties or in administrative work. This will put pressure on their other responsibilities as subject specialists, which makes the multi-site library particularly vulnerable in times of staffing reductions.

Although the multi-site factor has a fundamental effect on the type of structure adopted and on the work of library staff, it does not appear to lead to a change in the balance between the number of professional and non-professional staff employed. In this instance, COPOL statistics

show very little deviation between libraries from the mean ratio of 1 professional to 1.3 non-professional members of staff, at which Brighton itself operates.

The fact that multi-site libraries no longer have a higher proportion of professional staff is probably due to the trend towards giving subject librarians responsibility for wider subject areas and not making full-time appointments of such staff to annexe libraries. Some polytechnics are now using library assistants or part-time staff for evening duty and providing a professional enquiry service even at larger sites only during the day.

Without a common grading system for either professional or non-professional posts in polytechnic libraries, it is not possible to attribute with any accuracy the additional costs incurred by the staffing structure most appropriate to the multi-site library, as a large choice of different structures and gradings is available. It appears likely, however, that a single-site library would have a more hierarchical structure and make use of a range of lower professional grades than the flatter multi-site organisation. Several single or dual-site libraries do have such a structure and it was assumed that it would be adopted in Brighton's case. It was estimated that the resulting re-gradings might save around £500 a post or a further 4 per cent of the salaries bill.

Total staff costs attributable to multi-site working at Brighton were therefore calculated at 36 per cent of the annual staffing budget. This was seen as a minimum figure, to which had to be added such incidental costs as intersite travel and telephone calls, with the related loss of staff time due to travelling and communicating between sites.

Duplication of library materials

The fact that the multi-site situation leads to book and journal duplication was dismissed by Ashworth as being of less importance than originally thought[8], but rising prices and falling bookfunds are now compelling polytechnic libraries to keep a much closer watch on how their funds are being spent, and also to question the degree of self-sufficiency possible within individual libraries.

In most libraries, the subject librarian has responsibility for ordering course materials and the extent of duplication obviously varies according to library policy and patterns of teaching, as well as on the subject overlap between site libraries.

To ascertain the extent of book duplication at Brighton, a sample survey was carried out of 550 main entries in the union author catalogue containing all stock added since 1976. This showed that the level of duplication between any two libraries was 10 per cent, with a further 3 per cent of titles being found at three sites or more. Actual duplication naturally varied between subjects; a rate of 70 per cent was found in a similar analysis of the subject catalogue for education, which is an

element in courses taught across two main sites and one annexe library. It was recognised that a degree of duplication would occur through the provision of multiple copies whether the library was single or multi-site and allowance was made for this in the calculations.

Journal duplication could be worked out with more precision, as a single-site library would need few if any duplicated titles. At Brighton, where the number of current journal subscriptions (3,337) is high according to COPOL statistics, the duplication rate was found to be 15 per cent; 11 per cent on specialised material relating to subjects taught across two or more sites and the remainder on general newspapers and journals to which most libraries subscribed. The overlap was again considerable in certain subject areas and this is now the subject of further investigation.

Taking into account media spending also, it was estimated that 14 per cent of the total materials fund was being spent on duplicating items because of the multi-site situation. The annual sum involved was equivalent to the total materials budget of each of the two smaller sites, and the space taken up by material duplicated in this way was equal to the area occupied by one medium-sized site library.

As multi-site libraries receive no extra funding to take account of this need for duplication, this represents an additional cost to be met from revenue budgets. The extent of book and journal duplication at Brighton demonstrates that at present each main library has a high degree of self-sufficiency. There is little evidence of extensive use of more than one library, although reduced funds for books and journals, and the development of more inter-disciplinary courses may make use of two or more libraries more necessary in future. This loss of self-sufficiency will put the multi-site library at a greater disadvantage.

Capital equipment

While it was recognised that the need to duplicate items of capital equipment like security systems across a number of sites was a factor to be considered in determining capital budgets, the associated revenue costs were not thought significant and the list of items involved was small. Although it is true that, historically, the multi-site factor served to slow down the introduction of automated issue systems, just as it speeded up the adoption of centralised cataloguing, the fall in the real price of electronic equipment and the rate of technological development has actually worked in favour of this type of library. The cost of linking additional sites to an automated issue system is now comparatively small and the spread of microcomputers has meant a less heavy reliance on central facilities. A future is envisaged where even the traditionally centralised Technical Services departments will be devolved back to the site libraries, whose proximity and accessibility to the teaching areas will encourage development as 'information stations' in the microcomputer age[9].

Space requirements

The lack of guidance in adapting planning norms to the multi-site situation has long been a problem for polytechnic librarians as bookstocks and demands on services have increased. Even when overall space available to the library appears to be sufficient in terms of FTE student numbers, it is often unevenly distributed, and changes in the teaching programme can lead to lower usage of space in some areas and heavier pressure in others. Thus at Brighton, an overall space allocation of $0.9m^2$ per FTE conceals an actual range between $0.7m^2$ and $1.7m^2$, while a seating ratio of one place in every seven students (equivalent to the polytechnic mean in COPOL statistics) represents a range from 1 in 4 to 1 in 10. As well as uneven distribution of space, the inconvenience of many of the buildings adapted to make these libraries causes inefficient use to be made of the actual area available. The adoption of a unit cost system in polytechnics would highlight the variations in premises costs between different libraries, which are but part of the overall space problems of the multi-site polytechnic.

Cost-effectiveness

The conclusion of this study was that 36 per cent of salaries and 14 per cent of materials at Brighton could be attributed to the multi-site situation. This represented 28 per cent of the total library budget. The effect on capital budgets and space utilisation was also recognised, although no attempt was made to set a figure on these items.

The question of costs cannot be considered in isolation from services, although few objective measures exist for the evaluation of libraries or the assessment of their cost-effectiveness. It is recognised that actual levels of funding will depend on a number of different factors and, as the COPOL statistics show, the baselines from which polytechnic libraries operate vary widely.

Although multi-site libraries share a range of common costs and benefits, no clear formula has emerged by which to judge their staffing and materials costs in relation to services provided. I hope that the findings here described and the methodology used in this survey will be of interest to other libraries similarly attempting to analyse and evaluate their services in this current period of retrenchment.

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Graduate labour market statistics

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Revised version of a paper presented at the Aslib Social Sciences Information Group conference, 'Information for the Management of Higher and Further Education', Polytechnic of the South Bank, London, 22 June 1984.

This article is intended to give a detailed if summary account of recent statistics and research on the graduate labour market. The past five years have seen renewed interest in links between higher education and the economy. Graduate manpower statistics can therefore be seen not just as records of graduate deployment but also as means of assessing claims that have been made about higher education and the labour market. Where possible this account of the statistics includes a brief reference to how they can be used in this type of debate.

Statistics on the graduate labour market can usefully be split into four groups: stock, flow and regularly available ('monitoring') and ad hoc which would include the various individual surveys that are carried out for specific projects. By far the most plentiful and useful of the available information derives from statistics on flows: of new graduates into the labour force and of entrants to higher education. It is these statistics that are considered first.

Monitoring statistics on the flow

The first destinations survey

The most important single source on the graduate labour market is the annual first destinations survey. This is conducted by the careers advisory service at each university, polytechnic and most of the major colleges and institutes of higher education. The survey is directed at all new first degree graduates each year and is based on a short postal questionnaire sent to the new graduate. Around 60 to 70 per cent of graduates reply directly

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and this is supplemented by information from course tutors, friends and relatives etc. to yield a record for some 90 per cent of university and college graduates and 80 per cent of polytechnic graduates. Graduates are asked for their first firm destination after graduation. These are split broadly into employment, (home and overseas separately and also distinguishing short-term employment), unemployment or further study or training (which is classified in detail). Graduates entering UK employment are further asked for their occupation ('type of work') and sector of employment (e.g. engineering, public service etc.). Figures for individual institutions are collated into national totals for the three sectors and results for the universities[1] and polytechnics[2] are published; the college figures are available as unpublished mimeo[3]. Results for each sector are published for the primary destinations (employment, training etc.), for the sector of employment and the type of work. All these are in turn shown separately for men and women and for 76 different degree subjects or subject combinations. The tables also give a full record of the output of graduates from the universities and polytechnics and distinguish home from overseas graduates (although the polytechnic figures only show overseas graduates who returned home). The first destination volumes normally appear in the September following the calendar year of graduation. Thus results for 1984 graduates are just now available.

The universities have been producing a first destinations survey on essentially the same format since the early 1960s. The polytechnics followed suit in the mid-1970s and the colleges joined in since 1979. It is thus possible to examine changes and trends in graduate destinations over a fair length of time.

Published first destinations statistics represent just a part of the information that is available from the survey. For instance the published figures record fourteen broad occupation titles and nineteen sectors of the economy for graduates entering employment but the full classification gives over a hundred categories for these variables. All the results can also be further analysed by the personal and academic characteristics of the graduates. So separate results could be derived for graduates according to their age, region of residence, degree class, whether on a full-time or sandwich course (published polytechnic figures show separate figures for these but university statistics do not) and indeed for each named institution (although these results are regarded as confidential). Unpublished data generally can be obtained on application to the Universities Statistical Record at Cheltenham and from the Department of Education and Science for the polytechnics.

It must be admitted that notwithstanding its usefulness the first destinations survey is not well known outside the careers service although for instance, recently published figures on total graduate unemployment were from this source. The EMRU (Employment Market Research Unit) has made considerable use of the survey and has published a fairly detailed interpretation of the results in an article in the *Employment Gazette*[4], using figures from the 1980 survey. More recently the Department in

conjunction with the DES (Department of Education and Science) has produced a careers guide for sixth-formers which draws on the 1982 results. This guide *Graduates and jobs* has been circulated to every secondary school, university, polytechnic and institute of further and higher education and has also been quite widely reviewed[5].

Referring to the *Gazette* article mentioned above, this suggested that there were marked differences between degree subjects in their new graduate unemployment rates and that these represented real differences in the balance of demand and supply. Subjects with high unemployment cut across subject boundaries so that e.g. biological sciences, philosophy, sociology, arts and languages had unemployment rates well above average whereas civil, mechanical and electrical engineering, accountancy, maths and business studies all had relatively low unemployment rates. Sometimes academically similar subjects had quite different unemployment rates so that physics was more employable than chemistry. These differences in unemployment can be linked with the proportions of graduates entering further study and training and indeed with the range and type of job found by those graduates who did find work early on. Thus in subjects where unemployment was high graduates tended to work in a wide variety of jobs, which were often not seemingly related to their degree subject. There also seemed to be some systematic differences between university and polytechnic graduates in their ease of finding work, and polytechnic graduates in traditional arts and pure science often had particularly high unemployment rates. The polytechnic figures also showed that sandwich graduates generally entered employment more quickly than full-time (in the same subject) but they would of course have had more opportunity to make contact with employers.

The *Gazette* article also showed that student demand to enter higher education seemed to have responded to these signals from the graduate labour market. The biggest increases in demand in the second half of the 1970s for the universities were for subjects where employment prospects generally were good such as law, accountancy, business studies, most branches of engineering and computing. In subjects where graduate demand was low student demand had also tended to grow at a below average rate.

More recently the *Gazette* published an update of this article[6] which showed results for 1983 graduates (1984 figures are now available). This showed the persistence of the subject and institutional patterns observed earlier. This article also drew on unpublished figures to look in more detail at the distributions of graduates entering other training and particular groups of occupations such as management services (which includes computing), financial services (which covers accountancy) and secretarial, clerical and manual work. A follow-up to this article in the July *Gazette*[7] used previous first destination surveys to trace some of the major trends in the output and employment of new graduates since the early 1970s. The article shows that the fastest growth in graduate output was in the polytechnics but the subject patterns of growth in universities and

polytechnics have led to a convergence in the subject distribution of their graduates. The article also looks at the impact of rising female participation in higher education and shows that women have shifted their subject preferences to the more employable subject such as business studies, accountancy etc. but they have also played a major part in increasing output of traditional arts subjects, social sciences such as sociology, psychology and biological sciences – all subjects where new graduate employment prospects have been persistently below average. Trends in graduates' first destinations show a marked switch away from certain traditionally important areas such as research, teacher training and employment in education and public service and a move to employment in services and commerce. This decline in traditional employing sectors at a time of continued fast growth in numbers of graduates is linked to the rise in new graduate unemployment rates since the early 1970s.

The first destinations statistics do have gaps. There is for instance no information on the subsequent destinations of graduates who are initially unemployed and there is also only partial detail on the subsequent careers of graduates who undertake some form of further study or training. There are first destinations for people who successfully complete a course of postgraduate study but it is not possible to link these with graduates' first degree and it is not clear from the way the destinations are recorded, when the graduate left his postgraduate institution to take a job etc. There are no readily-available statistics for graduates who go on to further training in law, accountancy or many of the other forms of training although statistics on the first destinations of PGCE (Postgraduate Certificate in Education) graduates are available although from a different survey source[8].

Entry to higher education

Statistics on entry to higher education are also relevant for the graduate labour market since entrants not only provide the next generations of graduates but also, as suggested above, the graduate labour market provides signals which influence school leavers in their decisions about entry. Main sources of published statistics are for the universities and come from the UCCA system of university applications and admissions. UCCA (Universities Central Council on Admission) statistics are produced as an annual report and statistical supplement[9]. The report gives numbers of applicants and accepted candidates for each of the 76 degree subjects. It is thus possible to estimate a rough measure of difficulty of entry to different degree courses. The report also shows for A-level entrants the subject of their A-levels and their proposed degree subject so it is possible to deduce for instance how many young people with science or maths A-levels go into arts or social sciences. The supplement carries information on A-level grades and other entry qualifications of entrants for each of the degree subjects; it also gives figures for region of residence and age and summary figures for social class.

Figures for the polytechnics and colleges are not published and, because there is as yet no centralised system of applications for the polytechnics their entry statistics are much less detailed. However the DES collects annual figures on numbers of entrants to different degree courses and these can be linked to students' age, sex and entry qualifications including A-level grades.

UCCA have been producing these reports since the early 1960s, and it is therefore possible to examine changes over time in subject choices, numbers of entrants to universities etc. An unpublished EMRU paper[10] has looked for instance at changes in subject A-level entry grades and has found that grades generally did vary predictably in response to student demand. Thus the shift away from engineering in the early 1970s led to a marked reduction in entry grades which therefore offset some of the loss of students. The more recent revival in engineering has similarly lead to a sharp increase in grades – particularly in electronic engineering. Similarly, in sociology, A-level grades plummeted in the mid-1970s and have remained low ever since whereas in medicine there has been a steady increase in the grades demanded from a surprisingly low base by today's standards. UCCA reports only present a selection of the available statistics and successive years' reports vary the precise mix of results that are shown. Researchers should therefore always consider approaching UCCA for unpublished figures. The reports also include some very useful occasional analyses. The 20th report (supplement) looked at the destinations of young people who did not get a university place and showed, for people with different A-level grades, how many applied to a polytechnic, entered employment or returned to school or college to retake their A-levels.

Information on A-level grades for individual subjects at different institutions is collected as part of the administrative statistics by the Universities Statistical Record (who also process the first destinations). It is though not normally released. However, there are one or two guides produced by private individuals which offer this type of information although based on private surveys of school leavers[11].

Statistics on numbers entering higher education each year have been used to measure 'participation rates', i.e. the proportion of 18–19 year olds who go into higher education. Results are regularly produced by the Department of Education and Science in their Statistical Bulletin and Report series and these give separate figures for males and females and for a run of years[12]. Such calculations have been of particular interest in the current debate about the future demand for higher education and likely numbers of students. International comparisons of participation rates are also of interest and these have been documented[13,14]. The impression from necessarily uncertain comparisons is that the UK occupies a middling position in the range of comparable industrial countries. However any assessment of resources devoted to higher education would also have to take account of length of courses, wastage and costs amongst other things.

Monitoring statistics on the stock

Stock figures refer to the whole of the UK's resident population of graduates. Typical areas of interest for researchers are the numbers of graduates who are economically active (employer or seeking work), their age, sex, degree subject, whether they also have a higher degree and their graduating institution, their deployment across different industries and occupations. These latter can be expressed both in the sense of the proportions of graduates who are in manufacturing, say, but also the proportion of manufacturing employees who are graduates (as opposed to other qualifications). Stock figures give a cross-sectional view of graduates but they can also be used, with due caution, to deduce changes in graduates' careers over their lifetimes. Thus the occupational distribution of graduates of different ages might be used to deduce career patterns over a lifetime for example from specialist to management. Sectoral distributions can be used to assess shifts between industries e.g. from manufacturing to commerce. Finally information on the earnings of graduates of different ages can be used to deduce the lifetime earnings for a new graduate. The extra earnings graduates receive compared with people with lower-level qualifications can be treated as a return on the degree (where investment is foregone earnings during the course) and used to derive rates of return on that investment.

Figures on the stock of graduates are unusual because they are costly to collect and available statistics are usually obtained as the by-product of much larger surveys and do not receive much coverage in published reports. Researchers wishing to use stock figures would probably therefore need to refer to unpublished results or indeed the original computer tape. The published sources are therefore just described in summary below:

The Census of population

Conducted every ten years with latest results for 1981. Qualification tables are published separately, based on a 10 per cent sample and consisting of eleven tables (*Qualified manpower Great Britain.* HMSO, 1984). Published tables give age, sex, subject and level of qualification of graduates and then more selective analyses by economic activity (employed, unemployed, etc.), industry and occupation (separately).

The labour force survey (LFS)

Previously biennial now annual, latest results, unpublished are for 1983. It has asked for data on qualification (including subject of degree) since 1979. Based on a ½ per cent sample of households in Great Britain (GB) and has a sample of around 5,000 graduates.

The general household survey (GHS)

Annual survey of around 15,000 households in GB, which started in 1971. Sample includes some 500 graduates and has asked for subject of qualification since 1979. Published tables give brief selection of available results e.g. on age, sex, socioeconomic group. Unique source on graduate

pay and documents e.g. decline in relative earnings of graduates over the 1970s. The GHS has been used as a source for calculating rates of return to degrees and lower-level qualifications, and forms the basis for the estimates in the recent Green Paper on higher education.

The National Institute of Economic and Social Research has published a useful article on the distribution of the GB graduate stock using data from the LFS and GHS[15]. Of particular interest in stock figures is comparisons with other countries and the Institute makes a comparison with West Germany. Britain appears to have roughly the same proportion of its workforce who are graduates as West Germany (around 6 per cent) but we have a much lower proportion of workers with intermediate qualifications and therefore a larger percentage of workers with no vocational qualifications. The article is however more tentative on the distribution of our graduate stock by subject and on our annual flows of graduates compared with Germany.

The various professional institutes produce annual or biennial surveys of their members' pay and employment which give details of rather specific parts of the stock of graduates. Examples are the Royal Institute of Chemists, the Institute of Civil Engineers, Electrical Engineers and the Institute of Physics. Results from these surveys are of particular interest because they show earnings for people of different ages and by their highest qualification e.g. first degree, MSc or PhD. Since these surveys have usually been conducted for several years (some back to 1970) it is also possible to look at earnings' relativities over time between subjects and qualifications. Members of professional institutions are not necessarily representative of persons with a degree in a particular subject nor indeed working in a particular occupation (at graduate level) nevertheless their results are of interest. EMRU has recently compiled a comprehensive list of institutions providing this information and has documented trends in pay[16].

A useful summary account of the broad labour market characteristics of people with different qualifications is given in an *Employment Gazette* article[17] which uses the 1981 Labour force survey. The article shows the number of people with different qualifications who were employed or unemployed, and for those in work their industry and occupation, and proportions who changed job in the last year so giving a measure of comparative job mobility. For the unemployed there are details of their unemployment duration and their reason for leaving their last job. Separate results are shown for men and women and for some fifteen different qualification types from first/higher degree through the various teaching and technical qualifications down to CSE and no qualification. This article may well be updated using the results from the 1983 survey.

Specific research and ad hoc projects

Much useful information on the graduate labour market is obtained from specific research projects. There has not been a great deal of research into

graduates over the past few years but there have been a number of interesting projects. This final section is intended as a quick user guide to some of the most notable; they are arranged by topic.

Cohort studies

The concentration of monitoring statistics on the start of graduates' careers has prompted periodic longer-term studies of the first few years of a group (or cohort) of graduates. In 1977 the Unit for Manpower Studies conducted a retrospective study of the early careers of graduates who took a first degree in 1970. This was a major study of some 6,300 graduates drawn from the full range of higher education institutions and has been reported in[18]. The survey looked at first and latest job, and traced the movement of graduates between occupations and industrial sectors. The survey also covered graduates' pay, postgraduate qualifications and full details of their schooling and first degree and their personal characteristics including social class. One particular finding of interest was that over the early part of their lives graduates who entered employment straight after graduation earned more in 1977 than those who took a further academic qualification. Time spent in employment thus gave a better return in terms of salary. The data tape for this survey is now with the Essex survey archive.

More recently the CNAA (Council for National Academic Awards) has embarked on a study of CNAA graduates in a range of subjects who took a first degree in 1982. These have so far been followed one year forward into their careers; a further 'sweep' is planned. Researchers at Manchester Polytechnic Development Studies Unit also have such a 'prospective' cohort survey in hand which is looking particularly at full-time and sandwich graduate comparisons (this is also CNAA financed). The Colleges of Higher Education are newcomers to the provision of non-teaching degrees but it is understood that they too have undertaken a study of their first graduates in 1979 some three years into their careers. Results from this survey have yet to be published. The Brunel Expectations of Higher Education Project included a large postal survey of final year students in 1983. It is hoped to use this sample to make at least one follow-up study of these students after graduation. Finally the EMRU is considering an updated version of the 1977 survey but using 1980 graduates and following them five years into their careers.

Employers views

Employers' preferences can partly be deduced from the first destinations survey and this has the advantage that it shows what employers in total did. Nevertheless surveys of employers, which ask specifically what types of graduates they are seeking, are also useful. Alan Gordon, now at the Institute of Manpower Studies, undertook a survey of 58 employers in 1980 which asked what were the advantages and disadvantages of employing graduates, usefulness of different degree subjects, importance of degree class and preferences between different types of institution (universities,

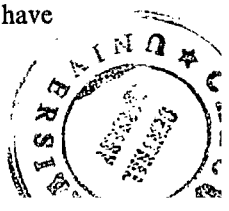
polytechnics)[19]. More recently the University of Brunel Expectations of Higher Education Project produced a report on interviews with some 130 employers[20]. This has been widely reported with regard for instance to employers' mixed feelings about polytechnic graduates and their apparent concern, in some jobs at least, for broad measures of ability rather than relevance of degree course. This survey is not of course a statistical source but is useful for its large amount of verbatim comment from employers.

For research purposes it is often useful to have a sampling frame for graduate employers from which to draw sub-samples. There is unfortunately no single list of all employers of graduates and indeed this would be hard to devise at a time when graduates are taking jobs over a wide range and level of job. Useful sources here are the various directories of graduate employers that are compiled each year as part of the recruitment process for each year's new graduates. Guides such as *Graduate opportunities* and the *Register of graduate opportunities and training* are produced annually and list several hundred of the main graduate recruiters with details of their addresses, business and types of graduates they are seeking. These guides are readily obtained from graduate careers advisory services.

Engineers

The engineering graduate labour market has attracted particular attention because, it is claimed, that graduate engineers have a crucial part to play in achieving economic growth. At the same time it is sometimes argued that the engineering graduate labour market works inefficiently, and in particular that the higher education system produces 'too few' engineers. Sometimes 'too few' is used to mean persistent shortages but frequently also it is argued that if more engineers were produced, even beyond current demands, then they would generate a demand for their services and indeed produce a 'supply side' expansion of output and employment. The most recent general examination of the engineering graduate labour market was contained in the report of the Finniston Committee[21]. As part of its investigations this body commissioned a major survey of the engineering profession in the UK which gathered a good deal of information about the stock of professional engineers. The survey report[22] gives details of current deployment (in 1979) by industry and occupation of engineers, earnings, use of knowledge in job, training after qualification and route to becoming a professional engineer. There are also personal data such as age and social class.

The Unit for Manpower Studies undertook an assessment of the engineering labour market in its general review of graduate supply and demand published in 1981[23]. This examined the long history of concern about the supply of engineers and the various measures that have been taken to address this. Various economists have made formal models of the engineering graduate labour market by relating demand for engineers to industrial output, research and development expenditure etc. There have



also been some studies of the rate of return to an engineering degree. These studies have usually been fairly sceptical about the existence of general shortages of engineers in the past or of persistent under-supply (see references 24, 25, 26 for example) but this debate continues (see also section on shortages).

Forecasts

There are no generally-available forecasts of future demand for graduates. This is largely for technical reasons: graduates are a relatively small group in the labour force, there are no good continuous historical figures for the stock, and there are difficulties in interpreting graduate employment as a measure of demand, for example where graduates might be using little or none of their degree training. There are a number of forecasts of graduate supply. The Institute of Manpower Studies produce annual projections of university graduate output for the next three years[27] although mainly for science and engineering graduates. (These projections are based on figures for known numbers of entrants to higher education and allow for length of course and wastage.) Very recently the DES has given projections of graduate output by subject in the universities and CNAA sectors separately in the recent report of the Committee on IT Skill Shortages[28].

Pay

Data on graduates' pay are very limited indeed and there is no very satisfactory source. As reported earlier the *General household survey* gives pay data for the stock of graduates, and this can be analysed by age group for instance, but not realistically for subject or occupation at the same time because of the small sample size. Up-to-date results are also not readily available. Various universities conduct surveys of the starting salaries of their new graduates each year (as part of their first destination survey) and of these the best known is the Leeds University survey. This gives results for graduates entering industry and commerce (i.e. excluding the public sector) and for three broad subject groups: arts and social sciences, pure science and engineering/technology. Results are also available for men and women and there is some information for postgraduates (but the sample is very small). Results from Leeds (and other institutions such as Aston, Bradford, Loughborough, Salford) are unpublished but available from careers services. EMRU produces a monitor of the various results and this is available on request[29]. The Central Services Unit, which provides a common service for university and polytechnic careers services compiles a quarterly assessment of salary offers drawn from vacancy notices for new graduates. This is an approximate source but does allow a breakdown of salaries into specific subjects such as chemical engineering, business studies etc. However the biggest category is usually for graduates of any discipline which embraces a wide range of subjects.

Postgraduates

The university first destinations survey also covers people successfully completing a postgraduate qualification at a university and results are published in the annual survey volumes on the same basis as for first degrees. Published figures distinguish sex and subject of postgraduate qualification but not its type (although there are separate figures for PhDs for all subjects). A particular difficulty with these results is that postgraduates are asked for their destination when they leave the university but this is only recorded in the year in which they are awarded their qualification. For some, particularly PhDs the dates might be some time apart. It is also, not possible to trace the careers of people from their first degree to their postgraduate qualification (and of course not all postgraduates will have taken a first degree). The various research councils collect data on completion rates for postgraduate qualifications and for instance the Science and Engineering Research Council gathers information on the first destinations of its award holders. Very recently the Institute of Manpower Studies[30] completed a survey of the entry into employment of people successfully completing a conversion course in Information Technology. These courses have recently been established and IT is of course an area of great interest at present. The survey also gives details of the graduates' personal and academic characteristics.

A distinct feature of postgraduate study is the explicit requirement, for public funding, that course provision should be closely influenced by the demands of the economy although a certain 'looseness of fit' is allowed for. In 1982 the Working Party on Postgraduate Education (WPPE) undertook an enquiry into postgraduate education for the Advisory Board for the Research Councils to assess this and other features of postgraduate provision. As part of their work the WPPE commissioned surveys of postgraduates who achieved their qualification in 1979 and a survey of their employers. These investigations covered postgraduates in engineering, science and social science but not arts and languages. The WPPE also commissioned some analysis from the Department of Employment's Early Careers of Graduates Survey which includes a sample of first degree graduates who proceeded to a postgraduate qualification. Summaries of theses studies are carried in the Working Party's report[31] and a report of the two specially-commissioned surveys has been published by the Policy Studies Institute[32]. The postgraduate survey covered the deployment of postgraduates soon after graduation (occupation, industry) their earnings and the perception of the value of their degree training in their job. The sample also included a control sample of people in the same subjects with just a first degree and so it was possible to compare the advantages of a postgraduate qualification. And again as a matter of interest there was little evidence of any salary advantage accruing to postgraduates. There were also quite clear differences between postgraduates in different subjects which tallied with results for people with just a first degree. The employer survey asked for views on the advantages and disadvantages of postgraduates and the relevance of their qualification. Most employers saw

advantages to postgraduates but quite a large minority had more mixed feelings about postgraduates.

Sandwich courses

Sandwich courses (where typically a year's work experience is incorporated into a three-year degree course) have emerged as an area of considerable interest in recent years. An inter-departmental committee has over the past two years commissioned a series of research projects which have looked particularly at employers' evaluations of full-time and sandwich course graduates and the views of employers offering sandwich placements. Their report has just been published[33]. Also a report of the main survey has recently been published and gives the researchers' own report of the evidence they gathered. The survey includes assessments of employers' preferences for full-time and sandwich graduates in different subjects and from universities and polytechnics. The survey also collected objective data on graduate salaries at age 22 and 25, career prospects, suitability for different types of work, differences in early training and productivity and influences of degree mode on recruitment preferences. The sample of employers was 468 and the survey refers to 1982.

The most detailed source on numbers is the recent annual *ASET Journal*[35]. This shows for each individual higher education institution running sandwich courses the numbers of their students by individual subject, numbers seeking placement and type of sandwich course ('thin', 'thick' etc). Volume 1 of the annual *University statistics* also gives information on numbers of sandwich students and graduates. One distinctive feature of sandwich courses is their concentration in the polytechnics and just a few universities. Thus just three universities account for almost half of all university sandwich students and sandwich students are almost entirely located in the technological universities. There is no overall record of the total number of sandwich graduates each year. For the polytechnics this information can be got from the first destinations volumes but for the universities the figures could only be obtained by special tabulation from the Universities Statistical Record (which produces the University first destinations).

Research into the labour market for sandwich graduates has generally been concerned with two broad aspects: the link between the work experience during the course and the academic parts of the course (the extent of 'integration' of the two) and the comparative performance of full-time and sandwich graduates in employment. 'Performance' is here measured by objective indices as outlined above and employer views. The author has produced a detailed literature survey of past research here[36] which suggests that there has been a fair degree of scepticism about the extent to which sandwich courses have met the claims that have been made for them.

In brief

This final section briefly summarises the main references on certain important areas of graduate employment which are less well documented.

Access to higher education
Policy and practice on access to higher education is linked to the labour market in several ways. As noted earlier trends in subject choices appear to have reflected market signals from the graduate labour market. This is also true of the proportions of young people entering higher education. Thus in the mid-1970s there is evidence of a turning away from higher education in the sense that the participation rate of young people was lower than might have been expected. Work on the determinants of participation by economists at the London School of Economics suggested that this could be linked to young people's perception of a falling rate of return to a degree in the sense of lower relative pay and other advantages usually associated with higher education. Such work also raises the question of whether greater access to higher education would further reduce the perceived employment advantage of a degree. Recent trends and patterns of access and entry to higher education have been well documented[37].

Mobility
The first destinations survey only records graduates' first job. There have been one or two studies which have traced graduates' subsequent careers specifically to look at how long graduates stay in their first job. Williamson's study[38] gives a detailed account of graduates' first job after graduation in 1970 and their latest job in 1977. Reasons for leaving the first job are also documented and the research shows patterns of movement of graduates between sectors of the economy. The Institute of Manpower Studies[39] reports a survey of how long graduates stay with their first employer using results for 1975–79.

Policy on higher education
In particular in relation to the labour market this is of great current interest. In 1979–80 the House of Commons Committee on Education, Science and Arts made a detailed investigation of higher education policy and looked in particular at the scope for making higher education more responsive to the needs of the economy[40]. The minutes of evidence and appendices are a rich source of information and opinion from government departments, academics and many other individuals and organisations with a direct or related interest in higher education.

Polytechnics
The labour market experience of polytechnic graduates has been of interest for some years. The polytechnics were established with a specific vocational intent and yet the polytechnics were in effect competing for the much longer established universities for students and for the attention of the labour market. A number of surveys have documented employers' very ambivalent attitudes towards the polytechnics and their graduates. Examples of early studies are references 41 and 42 while recent research into sandwich courses showed that possession of a polytechnic degree was the least favoured criterion for graduate selection. This was also a finding from the Brunel Expectations of Higher Education Project[43]. The higher

unemployment rates of new graduates from polytechnics than from universities also consistently emerges from analysis of the first destinations statistics although differences between degree subjects are also as important in the polytechnics as in the universities. Polytechnic graduate engineers from sandwich courses have unemployment rates that are of the same order as from universities (although the comparison is with full-time and sandwich courses)[44, 45, 46].

Graduate shortages

These have recently emerged as a matter of significant concern. The evidence suggests that such shortages are highly concentrated in electronics engineering and, to a lesser extent, computer science. Part of the problem seems to be a demand for experienced graduates (with 3–5 years in industry) and the supply of such people is necessarily in elastic in the short-run. Shortages have been discussed by a committee chaired by a Department of Trade and Industry minister[47]. Research evidence on shortages comes from surveys of graduate employers in 1983 and 1984 by the Department of Employment[48] as well as one or two smaller surveys e.g. into semi-conductors. One way to deal with shortages is to attempt to retrain people with related skills and there are now a number of conversion courses to turn scientists and engineers into information technologists. A recent survey by the Institute of Manpower Studies reports the early labour market experience of the first wave of graduates from such courses[49].

Graduate sponsorship

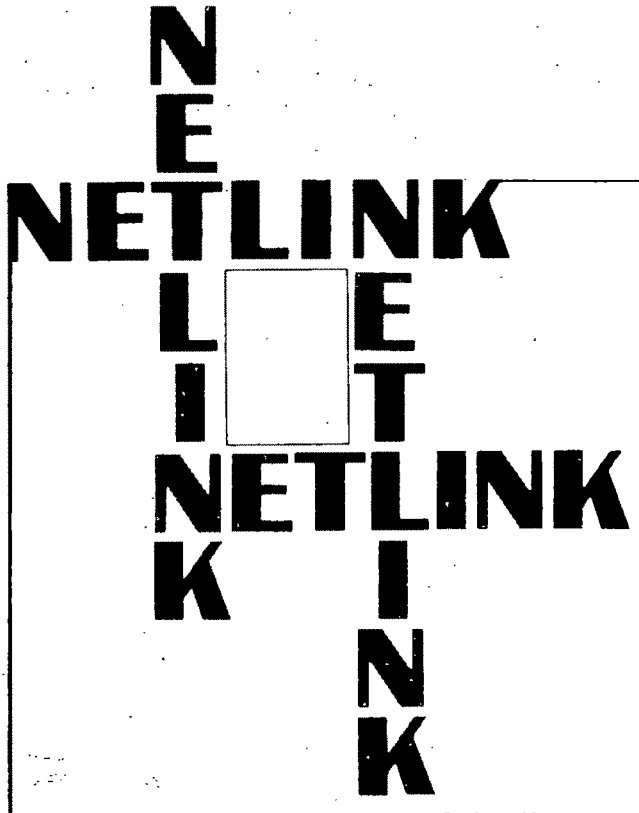
This has received renewed interest as a result of recent concern about shortages. The Institute of Manpower Studies have just published results of a two year research project which examined current patterns and recent trends in sponsorship of engineering students[50]. The research covered students in higher education institutions/courses and employers. The surveys show that sponsorship trends have reflected changes in the demand for graduates – there has been a fast increase in sponsorship of electronics engineering students. However, only about 60 per cent of sponsored students return to their sponsor after graduation. Few employers indeed had carried out any sort of cost-benefit assessment to see whether sponsorship really brought them any advantage.

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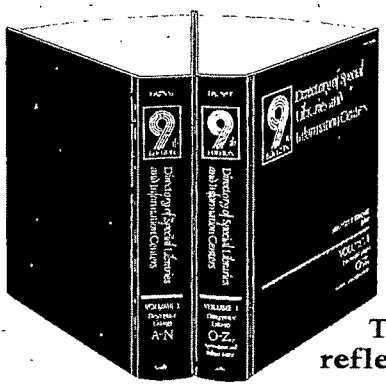
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